

**U.S. DEPARTMENT OF COMMERCE
National Technical Information Service**

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**Model State Information System Training
Program. Volume I. Slide/Cassette
Work Book for MSIS Overview**

Cincinnati Univ, Ohio Southwestern Ohio Regional Computer Ctr

Prepared for

Environmental Protection Agency, Washington, D C

Jun 77

Model State Information System
Training Program

Volume I

Slide/Cassette
Workbook

For

MSIS OVERVIEW

Prepared for the

U.S. Environmental Protection Agency
Office of Water Supply
Washington, D.C. 20460
under GSA Contract No. GS-05S-10458
Task Assignment OWS-77-01

by the
SouthWestern Ohio Regional Computer Center
Cincinnati, Ohio
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Ellen G. Miller
Project Manager, OWS-77-01

TABLE OF CONTENTS
Vol. I MSIS Overview

	<u>Page</u>
Acknowledgements	ii
Table of Contents	iii
Introduction	1
Instructions to User	3
Individual Unit Material	7
Pre-Test	75
Exercises	77
Answers	82
Post-Test	87
Glossary	89
Acronyms (abbreviations)	95
Extracts From MSIS Documents	97

INTRODUCTION

This slide/cassette course on the Model State Information System (MSIS) is one of four prepared by the SouthWestern Ohio Regional Computer Center, Cincinnati, Ohio, for the Office of Water Supply, U.S. Environmental Protection Agency, Washington, D.C. The four slide/cassette courses are:

Volume I - MSIS Overview

Volume II - MSIS Subsystems

Volume III - Data Entry

Volume IV - Selection Process

Each slide/cassette course has a corresponding workbook, designed to aid persons learning about MSIS. This workbook can be used in conjunction with the MSIS Slide/Cassette Training Program or it can be used advantageously by itself as a learning or reference tool. Conscientious application of the material contained herein will result in a deeper knowledge of the entire MSIS program.

Before beginning the slide/cassette presentation, please turn to the Instructions for Users and read the directions to facilitate optimum utilization of the slide/cassette teaching device.

NOTES

INSTRUCTIONS TO USER

The design of this Model State Information System (MSIS) Slide/Cassette Training Program assumes that each viewer has in his possession and will use the workbook which corresponds to the volume indicated by the slide/cassette package. This workbook is intended to serve as a learning aide and, later, as a reference tool. These instructions should be read in order to derive maximum benefit from this workbook.

The Individual Unit Material is a storybook version of all material contained on the slide/cassette presentation. Information contained on the cassette tape is duplicated verbatim in the textual portion of the individual unit material. The corresponding slide is duplicated to allow a visual facsimile of the slide presentation. Therefore, as a reference tool, the entire slide/cassette presentation can be reviewed in great detail.

The Pre-Test is to be completed prior to using the slide/cassette devices. It is designed to measure the viewer's individual knowledge of MSIS before exposure to the information contained in this presentation. Upon completion of the Pre-Test, the viewer is to turn on the slide projector and accompanying cassette tape player and proceed with the training course.

Bring up the first slide on the screen; then start the recorder.

Instructions concerning the Exercises are contained in both the slide/cassette presentation and the corresponding workbook. The phrase "STOP TAPE...COMPLETE REVIEW/EXERCISES" indicates that it is time to measure the viewer's comprehension of material previously presented. The slide immediately following will refer the viewer to the specific exercise corresponding to the material covered. The exercises are placed in the workbook in their order of occurrence, but the viewer is responsible for matching the number appearing on the screen with that appearing in the upper right-hand corner of the exercise.

The Exercises are designed to be self-evaluating and should be used accordingly. The viewer should turn the slide projector and cassette tape player off, complete the appropriate exercise(s), compare his/her answers to the corresponding answer sheet provided in this workbook, and judge accordingly whether the information was successfully transferred or if it should be reviewed for a more complete understanding.

The Glossary will serve as a quick reference for words unfamiliar to the viewer. Words which have particular reference to the Model State Information System and whose meaning in this context may vary from the common definition are listed in the Glossary. Because the Glossary provides a concise list of terms pertinent to the data processing field and, more specifically, MSIS, it is

advisable for the viewer to read through the words and their definitions at some point during the training period. The amount of exposure necessary for a complete understanding of terms will depend upon the viewer's individual previous familiarity with data processing and MSIS terminology.

The Acronym portion of this workbook lists all abbreviations formed by combining initial letters which occur in this course's content. Because the Model State Information System is itself commonly referred to as an acronym (ie., MSIS) it is imperative that the viewer of this slide/cassette program become familiar with and study the abbreviations listed here. They are all explained in detail during the training course, but only by repeated exposure and examination will the trainee recognize the acronyms commonly used in connection with the MSIS.

Extracts from MSIS Documents consist of selected system documentation, relevant Environmental Protection Agency publications, reports generated by system runs, and any other information deemed necessary to aid further understanding and to provide background information on the contents contained in this slide/cassette course presentation.

Upon successful completion of material covered on a slide/cassette tray, the viewer will be informed that the current portion is over by a slide which directs him/her to "CHANGE SLIDE TRAY AND AUDIO CASSETTE". It will be followed by a blank

slide. At this time, the viewer will replace the slide tray and corresponding audio cassette tape with the next sequentially designated slide/cassette presentation and continue the training course. The slide/cassette presentation is not complete until the viewer encounters an "END OF VOLUME" slide. At this point, the viewer should turn off the slide projector and audio device, complete the Post-Test referenced during the later portion of the presentation, and compare the Post-Test to the Pre-Test to evaluate the amount of specific knowledge which was obtained during this training presentation.

It is the intention of this MSIS slide/cassette training program not only to impart knowledge of the Model State Information System, but to provide the viewer with an opportunity to practice the knowledge gained, and to refer back to this workbook when using MSIS in daily operations.

Model State Information System

MSIS

Slide-Cassette Training Program

Volume I

Units I & II

INDIVIDUAL UNIT MATERIAL

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Volume I
MSIS Overview

INDIVIDUAL UNIT MATERIAL

I.1

Model State
Information System
(MSIS)
Slide/Cassette
Training Program

This is the first of four volumes comprising the Model State Information System Slide-Cassette Training Program.

I.2

MSIS

The Model State Information System, commonly referred to as MSIS, is a computer system designed to help the states implement the Safe Drinking Water Act.

I.3

SouthWestern Ohio
Regional Computer Center
Cincinnati, Ohio

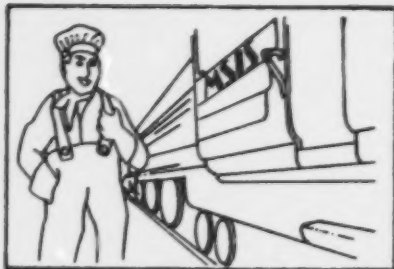
Both the computer system and this accompanying slide-cassette training program were developed by the Southwestern Ohio Regional Computer Center, or

I.4



SWORCC, under contract with the Office of Water Supply, Washington, D. C.

I.5



Hi, I'm the conductor of the MSIS train, I'll be guiding you through this training program.

I.6



It is my responsibility to keep things "on track" and see that you have a pleasant journey and a good learning experience. Let's start by looking at the purpose of MSIS.

I.7

Purpose of MSIS

The purpose of the MSIS Computer System is to help the states implement the regulations resulting from the national Safe Drinking Water Act (SDWA).

I.8

MSIS Capabilities...

The MSIS has two distinct capabilities.

I.9

1. It maintains records on public water supplies (PWS) and the quality of the water they supply

First, MSIS maintains records on public water systems or (PWS) and the quality of the water they supply.

I.10

2. It prepares reports required by the federal government under the national Safe Drinking Water Act (SDWA)

Second, MSIS prepares reports required by the Federal government under the national Safe Drinking Water Act.

These reports are output in a format which satisfies the federal government's annual reporting requirements.

I.11



Before taking up the formal course material, I think it would be helpful to define some data processing terms. MSIS is a computer program. Sound understanding of its functions and capabilities is dependent on your familiarity with commonly used data processing terms.

I.12

Data Processing
Terminology

If you are familiar with data processing terms, skip these next terminology slides.

I.13

Computer Program

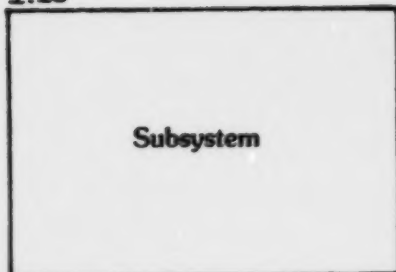
A computer program is a logical set of instructions for the computer in machine-readable format. Computer programs are often decks of punched cards.

I.14

Computer System

A computer system is a group of computer programs developed to accomplish specified functions. MSIS is such a computer system.

I.15



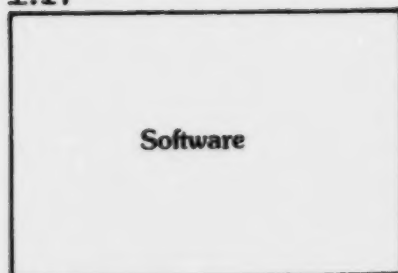
A computer system is made up of subsystems; MSIS has nine such subsystems.

I.16



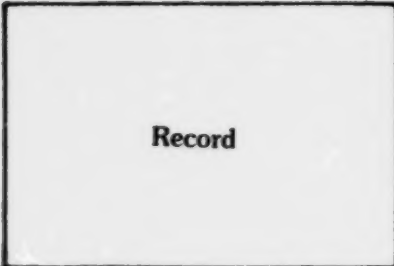
Hardware is any physical device of the computer. Examples are: printer, card reader, and card puncher.

I.17



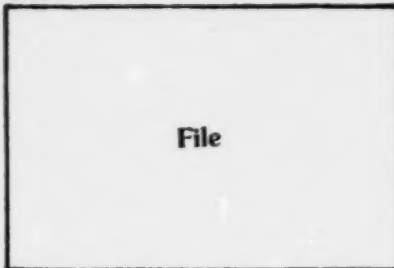
The computer programs are referred to as software.

I.18



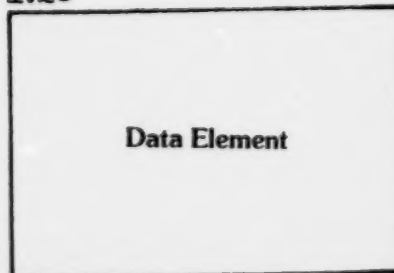
A record is a logical group of information. An example is the information contained in your social security record.

I.19



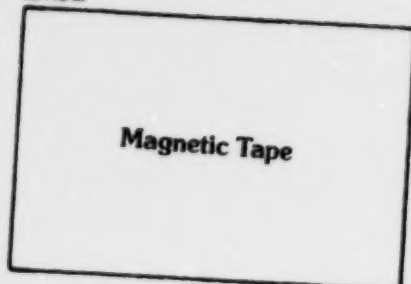
A file is a group of records, usually in a specific sequence, and often on magnetic tape. An example would be the Cincinnati social security file.

I.20



A data element is an identifiable item within a record. Your social security number is such a data element.

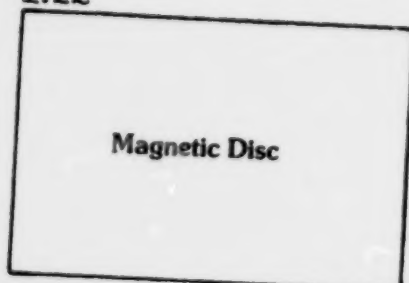
I.21



Magnetic tapes are used to store limited amounts of machine-readable information sequentially.

It resembles home tape recorder tape, but it is wider.

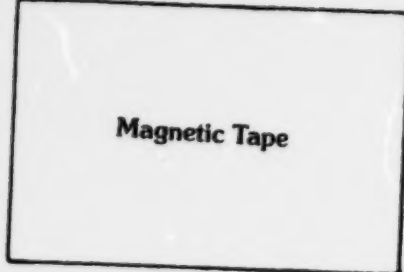
I.22



Magnetic discs are used to store large amounts of machine-readable information and are directly accessible by the computer.

They look like a stack of LP records.

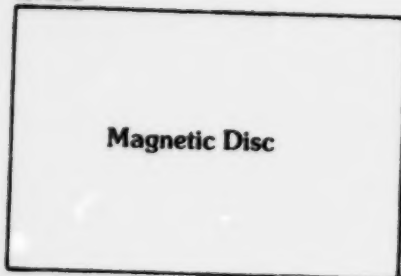
I.21



Magnetic tapes are used to store limited amounts of machine-readable information sequentially.

It resembles home tape recorder tape, but it is wider.

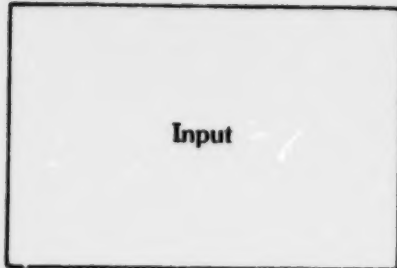
I.22



Magnetic discs are used to store large amounts of machine-readable information and are directly accessible by the computer.

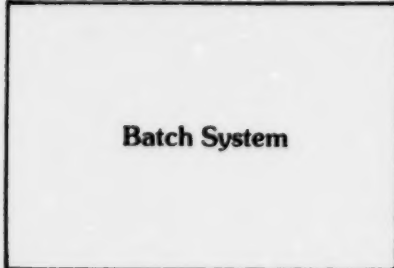
They look like a stack of LP records.

I.23



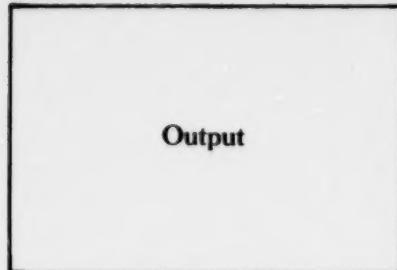
Input is any information to be entered on a computer file or table, or the actual process of entering such information. Key-punched cards are often used to enter input.

I.24



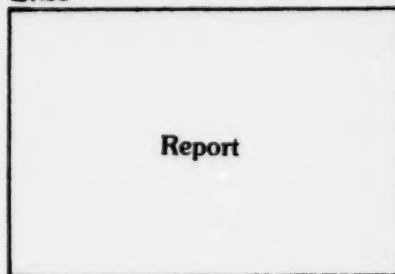
A batch system accumulates groups of inputs, such as key-punched cards, before submitting those inputs to the computer. The counterpart of the batch system is the on-line or real-time system where inputs are submitted without delay. MSIS is a batch system.

I.25



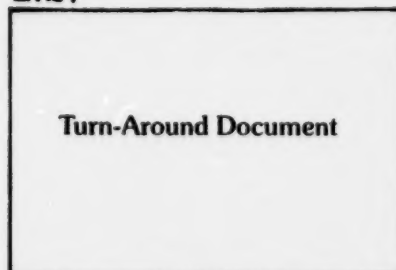
Output is information already processed by the computer. The federal reports produced by MSIS are examples of output.

I.26



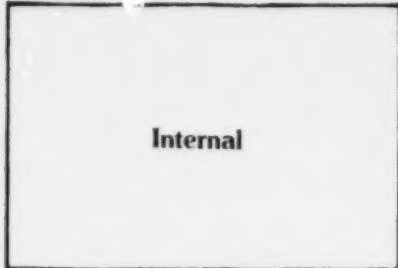
A report is output by the computer in user-readable format. Examples are printed listings.

I.27



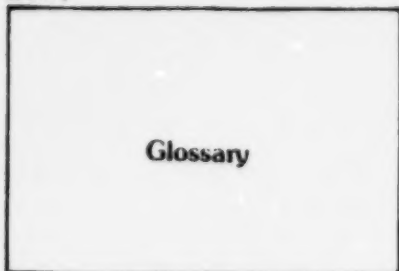
A turn-around document is a report printed by the computer and later used as an input to the computer. MSIS provides turn-around documents.

I.28



The word "internal" refers to processing done by computer programs within the computer.

I.29



Your workbook contains a glossary. The computer terms just defined as well as other generally unfamiliar words and abbreviations are included there for your convenience.

Two non data-processing terms especially relevant to your understanding of the formal material to be presented are the terms "course" and "unit".

I.30

Course

Course: a section within the MSIS training program

Volume I of the MSIS Slide-Cassette Training Program, which you are now viewing, is a course as defined here.

I.31

Unit

Unit: a section within the course

While the number of units may vary from course to course, this particular course contains two units.

I.32



That concludes the preliminary discussion. From this point forward, the tour will cover the formal course material.

I.33

Volume I MSIS Overview

Volume I of the Model State Information System Slide-Cassette Training Program covers both the background (Unit I) and general description (Unit II) of the MSIS Computer System. Thus, it is aptly named the MSIS Overview.

I.34

Unit I Safe Drinking Water Act Regulations Development of MSIS Unit II MSIS Features

The first unit of the MSIS Overview is concerned with the events which have led to the creation and subsequent development of MSIS.

The second unit considers the MSIS system's design and describes its nine subsystems.

**Volume I
MSIS Overview**

Unit I

I.35

**Unit I
Safe Drinking Water Act
Regulations
Development of MSIS**

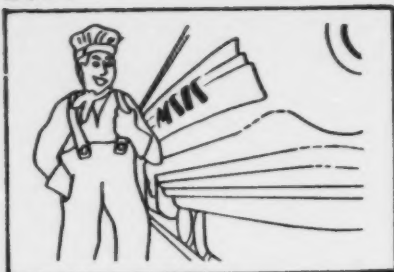
Unit I concerns itself with these two events, which resulted in the Model State Information System's development.

I.36

GOAL
To familiarize the viewer with the events leading to the development of MSIS.

The goal for Unit I is to familiarize the viewer with the events leading to the development of MSIS.

I.37



Let me define two terms for you. As used here, a goal is the end result sought and is stated in broad, general terms. An objective is much more specific, and when stated in behavioral terms can be easily measured to determine progress. When the behavioral objectives are properly expressed, their attainment will assure that the goal is reached.

Now, let's look at the specific objectives for Unit I.

I.38-39

Behavioral Objectives (Unit I)	
SDWA - Define contaminant, public water system, and maximum contaminant level. - Explain other requirements of the SDWA MSIS type. - State the four conditions a PWS must meet to be exempt from the regulations.	Regulations - Define Community PWS. - List the four contaminant categories. - List the five federal reporting requirements. Developing MSIS - Name at least one reason why MSIS was developed by the federal government for the states. - Name at least one reason why MSIS is a decentralized system.

These are the behavioral objectives for this unit. Both the material presented and the review exercises will focus on these areas. Take some time to fix these in your mind.

I.40

Sequence of Events

- Introduction
- Safe Drinking Water Act (SDWA)
Review/Exercises
- Regulations
Review/Exercises
- Development of MSIS
Review/Exercises

Material will be presented in this sequence.

Note the review exercise after each major category of materials is covered. These exercises are provided to help reinforce your learning and to give you an opportunity to determine your own progress. There is also a pre-test for the course in your workbook. If you have not completed it, you should do so at this time.

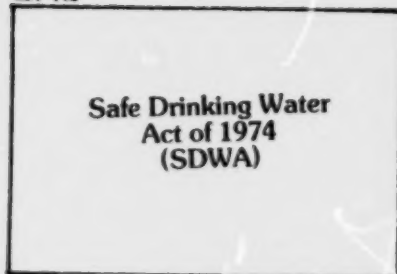
By way of introduction, let's look briefly at each topic for this unit.

I.41



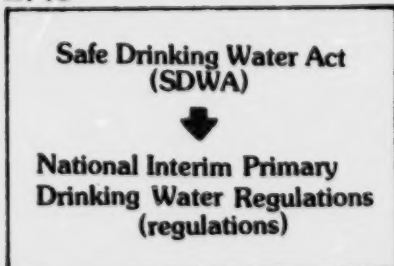
Our consideration logically commences with the Safe Drinking Water Act (SDWA) of 1974.

I.42



The Safe Drinking Water Act, PL 93-523, expresses a general concern with the quality of water furnished for human consumption by public water systems throughout the nation. It required the Environmental Protection Agency to develop the regulations necessary to implement the act.

I.43



In turn EPA authorized its Office of Water Supply to develop and implement regulations within the broad guidelines established by the act itself.

I.44

Development of MSIS

Following promulgation of the regulations, the Office of Water Supply:

- (1) Contracted with American Management Systems, Inc., to conduct a feasibility study concerning possible development of a computer system and to create its general systems design;
- (2) Subsequently contracted with the Southwestern Ohio Regional Computer Center to develop a detailed design, computer programs, documentation, and an installation plan for a computer system.

I.45

**Unit I
Safe Drinking Water Act
Regulations
Development of MSIS**

We will now look in detail at each of these areas, commencing with the Safe Drinking Water Act.

I.46



The purpose of the 1974 Safe Drinking Water Act, PL 93-523, is to assure that the public is provided with safe drinking water. It is especially concerned with the effects on health of certain contaminants found in water.

I.47

Safe Drinking Water Act (SDWA) defines:

- Public Water System (PWS)
- Contaminants
- Maximum Contaminant Level (MCL)
- Regulations needed

The act defines a public water system and then proceeds to specify what contaminants that PWS will monitor, the acceptable levels of such contamination, and the requirements for regulating each.

We will now discuss each of these areas in more detail.

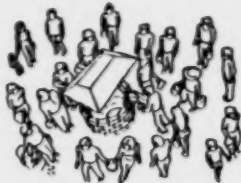
I.48

Safe Drinking Water
Act (SDWA) defines:
• Public Water System
(PWS)

SDWA defines a public water system as, "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals."

I.49

Public Water System (PWS)



I.50

Safe Drinking Water
Act (SDWA) defines:
• Contaminants

Within the act a contaminant is defined as, "any physical, chemical, biological, or radiological substance or matter in water."

I.51

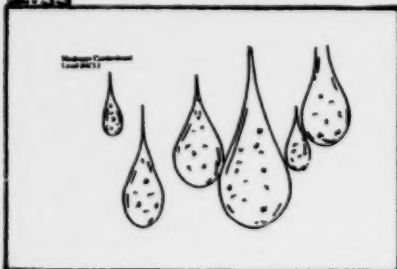


I.52

Safe Drinking Water
Act (SDWA) defines:
• Maximum Contaminant
Level (MCL)

Maximum Contaminant Level (MCL) is defined as, "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system."

I.53



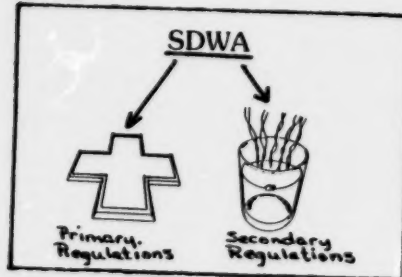
I.54

Safe Drinking Water Act (SDWA) defines:

- Regulations needed
Primary
Secondary

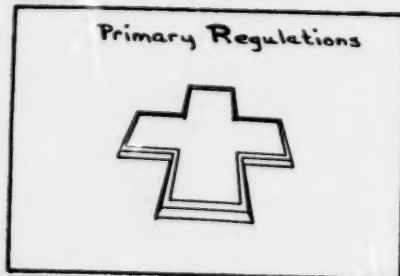
The act specifies two types of regulations, primary and secondary.

I.55



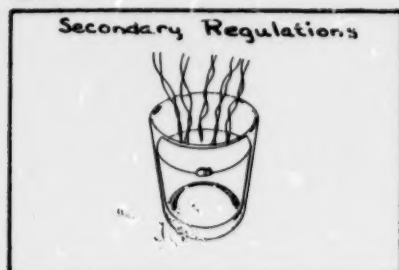
The primary regulations are defined as those regulations concerned with the health of the people. It should be noted that the primary regulations are themselves divided into two categories, interim and permanent

I.56



The interim regulations, formally known as the National Interim Primary Drinking Water Regulations went into effect on June 24, 1976 but will eventually be replaced by the permanent regulations. Little change is expected with this transition.

I.57



The secondary regulations concern themselves with the aesthetic aspects of water quality; that is, odor, color, and taste.

It should be noted that no secondary regulations had been written at the time this program was developed.

I.58



Let me make two points here to avoid confusion.

First, future references to "regulations" will mean the National Interim Primary Drinking Water Regulations.

Second, the regulations do not pertain to everybody. There are exceptions.

I.59

**Safe Drinking Water
Act (SDWA) defines:**

- Public Water System (PWS)
- Contaminants
- Maximum Contaminant Level (MCL)
- Regulations needed
 - Primary
 - Secondary

That concludes what SDWA defines.

It also specifies two things:

I.60

**Safe Drinking Water
Act (SDWA) specifies:**

- EPA development of regulations
- State primacy requirements

Specifically, the act calls for a partnership between EPA and the states. Not only was EPA charged with developing the implementing regulations, but also with urging the states to accept the responsibility for monitoring their own public water systems, that is, "Primacy."

I.61

**Safe Drinking Water
Act (SDWA) specifies:**

- EPA development of regulations
- State primacy requirements
 - state regulations
 - enforcement procedures
 - record keeping
 - federal reporting
 - variances and exemptions
 - emergency provisions

The first half of the partnership was satisfied when EPA promulgated the regulations after substantial comment from professional bodies and the general public.

I.62

**Safe Drinking Water
Act (SDWA) specifies:**

- EPA development of regulations
- State primacy requirements
 - state regulations
 - enforcement procedures
 - record keeping
 - federal reporting
 - variances and exemptions
 - emergency provisions

The second half of the partnership is primary enforcement responsibility, referred to as "primacy". The states accepting primacy would accept the responsibility for monitoring their public water systems and reporting the results to the federal government in accordance with the implementing regulations. The Safe Drinking Water Act sets forth six basic requirements for a state to attain primacy.

I.63

**Safe Drinking Water
Act (SDWA) specifies:**

- EPA development of regulations
- State primacy requirements
 - state regulations

The first requirement states that more stringent state regulations may be developed, but the minimum requirements of the federal regulations are unalterable.

I.64

Safe Drinking Water Act (SDWA) specifies:

- EPA development of regulations
- State primacy requirements
state regulations
enforcement procedures

Next, the states must have enforcement procedures in effect.

I.65

Safe Drinking Water Act (SDWA) specifies:

- EPA development of regulations
- State primacy requirements
state regulations
enforcement procedures
record keeping

Third, the states must keep records on their PWS's, and...

I.66

Safe Drinking Water Act (SDWA) specifies:

- EPA development of regulations
- State primacy requirements
state regulations
enforcement procedures
record keeping
federal reporting

...must report to the federal government in accordance with the federal regulations.

I.67

**Safe Drinking Water
Act (SDWA) specifies:**

- EPA development of regulations
- State primacy requirements
 - state regulations
 - enforcement procedures
 - record keeping
 - federal reporting
 - variances and exemptions

In the area of variances and exemptions, the state must specify the minimum requirements under which variances and exemptions will be granted are set forth. Any state regulation must be at least equally as restricting as the federal requirements.

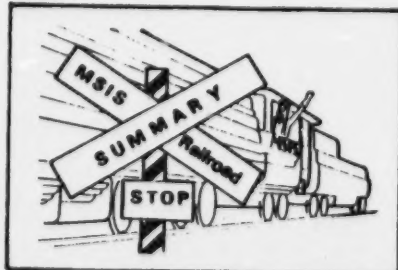
I.68

**Safe Drinking Water
Act (SDWA) specifies:**

- EPA development of regulations
- State primacy requirements
 - state regulations
 - enforcement procedures
 - record keeping
 - federal reporting
 - variances and exemptions
 - emergency provisions

Finally, the state must have a practical plan to provide water during emergencies.

I.69



That concludes the material on the Safe Drinking Water Act. Let's review briefly. First, recall what SDWA defines.

I.70

- Safe Drinking Water Act (SDWA) defines:
- Public Water System (PWS)
 - Contaminants
 - Maximum Contaminant Level (MCL)
 - Regulations
 - Primary
 - Secondary

Remember that the primary regulations are concerned with the health effects of drinking water.

I.71

- Safe Drinking Water Act (SDWA) specifies:
- EPA development of regulations
 - State primacy requirements

The act also included these two specifications.

I.72

Review/Exercises

It's time now to use your workbook. Please turn to the exercise shown.

I.73

Refer to: I.1.E1
I.1.A1

Carefully complete the work and compare your results with the answer sheet provided. Review the written material in your workbook as necessary for complete understanding.

STOP TAPE . . . COMPLETE REVIEW/EXERCISES

CHANGE SLIDE TRAY AND AUDIO CASSETTE

I.74

Unit I
Safe Drinking Water Act
Regulations
Development of MSIS

The second major topic for consideration is the regulations.

I.75

Regulations

You will recall that the Safe Drinking Water Act specifies that implementing regulations would be developed by the Environmental Protection Agency. EPA responded by publishing the National Interim Primary Drinking Water Regulations.

I.76

Regulations

- Define Public Water System (PWS)
- Establish monitoring requirements
- Establish state reporting requirements
- Establish federal reporting requirements

Essentially, the regulations further define a public water system and then establish complete monitoring and reporting requirements for those systems which qualify as PWS's.

I.77

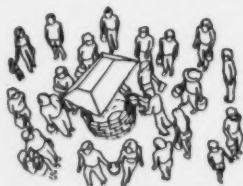
Regulations

- Define Public Water System (PWS)

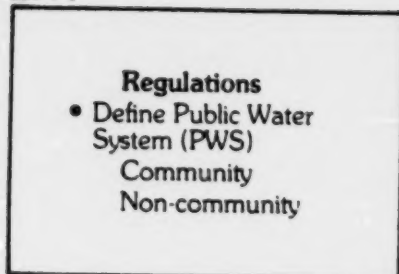
The regulations refined the SDWA definition of a PWS. As defined in the regulations, a PWS is "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year."

I.78

Public Water System (PWS)



I.79



This grouping is then further divided into two types -- community and non-community.

I.80



The community PWS is defined as, "that public water system which serves at least 15 service connections used by year-round residents, or regularly serves at least 25 year-round residents."

Note the addition of the provision for year-round residency, which was not included by SDWA.

I.81



A non-community PWS is defined by the regulations as, "a public water system that is not a community water system." Thus, all PWS's not meeting the quali-

fications cited for a community PWS are simply termed "non-community".

I.82



The necessity of year-round residency is distinctive. Using this definition, summer resorts, hunting lodges, camping areas, and other seasonal type PWS facilities would be excluded from the stringent requirements specified for community public water systems. Why? Because infrequent drinking of their water is not assumed to carry an equal health effect. However, they are regulated by the requirements for non-community PWS's.

I.83

Regulations

- Define Public Water System (PWS)
- Establish monitoring requirements

Monitoring requirements are established for four areas.

I.84

• Establish monitoring requirements

- ▣ contaminants
- ▣ maximum contaminant levels (MCL)
- ▣ sampling rates
- ▣ analysis techniques

The regulations specify which contaminants will be monitored, the maximum safe levels of those contaminants, how often the PWS will be sampled for the contaminants, and the techniques to be used for analysis.

While the contaminants will be considered in more detail, a discussion of the MCL's, sampling rates, and analytical techniques is not appropriate to this course.

I.85

- Establish monitoring requirements
- contaminants

The contaminants themselves are further divided into the

I.86

- Contaminants
 - Microbiological
 - Inorganic chemical
 - Organic chemical
 - Physical
 - Radiological

five separate types shown.

Micro-biological is also commonly referred to as bacteriological. Physical is also referred to as turbidity. Let's look at the actual entries under each broad type.

I.87

- Contaminants
 - Microbiological:
 - coliform bacteria

Under microbiological only the Coliform Bacteria contaminant is listed for monitoring.

I.88

• **Contaminants**
Microbiological
Inorganic chemical

However, there are ten inorganic chemical contaminants.

I.89

• **Contaminants**
Inorganic chemical:
arsenic, barium,
cadmium, chromium,
fluoride, lead,
mercury, nitrate,
selenium, and silver

The ten contaminant names are shown for information only. A discussion of the MCL for each is not relevant to this course. Refer to the regulations contained in your workbook for more information.

I.90

• **Contaminants**
Microbiological
Inorganic chemical
Organic chemical

There are six organic chemical contaminants.

I.91

Contaminants

Organic chemical:
endrin, lindane,
methoxychlor,
toxaphene,
2,4-D, and
2,4,5-TP silvex

All of these substances are strong pesticides or herbicides.

I.92

• Contaminants

Microbiological
Inorganic chemical
Organic chemical
Physical

Only a general description of a physical contaminant is given by the regulations. This contaminant is applicable only to those public water systems using surface water. The general term used is

I.93

• Contaminants

Physical:
turbidity

"turbidity", which usually means sediment.

I.94

- **Contaminants**
 - Microbiological
 - Inorganic chemical
 - Organic chemical
 - Physical
 - Radiological

Two types of radiological MCL's are listed in the regulations.

I.95

- **Contaminants**
 - Radiological:*
 - Gross Alpha*
 - radium 226*
 - radium 228*
 - Gross Beta*

Radium 226 and 228 are shown separately in the gross alpha category since an MCL is listed for each of these elements in addition to an MCL for the entire category of gross alpha particles.

Gross beta has no similar breakdown. The MCL refers to the collection of all contaminants in the gross beta category; however, there is a breakdown based on sampling requirements.

I.96

Regulations

- Define Public Water System (PWS)
- Establish monitoring requirements
- Establish state reporting requirements

PWS's are required to report to the states within a general period of forty days. Violations should be reported within forty-eight hours.

I.97

Regulations

- Define Public Water System (PWS)
- Establish monitoring requirements
- Establish state reporting requirements
- Establish federal reporting requirements

The regulations list two general responsibilities for states. First, that the states monitor their PWS's in accordance with the regulations and maintain records of said monitoring; and second, that portions of this recorded information be made available annually to the federal government.

I.98

• Establish federal reporting requirements

Update of Public Water System Inventory (PWSI)
Summary of PWS violations
Report of State enforcement actions
Variances and exemptions granted

There are five specific reporting requirements for states accepting primacy. The first four are met by MSIS. The first annual requirement is to report

I.98

- **Establish federal reporting requirements**

Update of Public Water
System Inventory (PWSI)
Summary of PWS violations
Report of State
enforcement actions
Variances and exemptions granted

any changes to the state's inventory of water systems to the federal government. The inventory is maintained by a subsystem of MSIS. A complete discussion of this and other reporting features is contained in Volume II, MSIS Subsystem Functions.

I.99

- **Establish federal reporting requirements**

Update of Public Water
System Inventory (PWSI)
Summary of PWS violations

An annual summary is required of any violation of the federal regulations -- contaminants, contaminant levels, sampling requirements, etc.

I.100

- **Establish federal reporting requirements**

Update of Public Water
System Inventory (PWSI)
Summary of PWS violations
Report of State
enforcement actions

The enforcement actions referred to here are those that the state has taken against its public water systems which have violated the regulations.

I.101

- Establish federal reporting requirements

Update of Public Water System Inventory (PWSI)
Summary of PWS violations
Report of State enforcement actions
Variances and exemptions granted

All states must make an annual report to the federal government on the status of variances and exemptions granted to their PWS's. There is a fifth reporting requirement which is not fulfilled by MSIS. This is "prompt" notification of variances and exemptions granted.

I.102



Let's review this topic

I.103

Regulations

- Define Public Water System (PWS)
- Establish monitoring requirements
- Establish state reporting requirements
- Establish federal reporting requirements

The regulations really focus on four areas: first, defining PWS and other key terms; second, requirements placed on a public water system to monitor its water; third, state requirements for PWS reporting to the state;

and, fourth, requirements for state reporting to the federal government.

I.104

- Establish monitoring requirements
 - ▣ contaminants
 - ▣ maximum contaminant levels (MCL)
 - ▣ sampling rates
 - ▣ sampling techniques

The monitoring required by the regulations is very thorough, specifying the contaminant to be monitored, the allowable levels of each contaminant, the sampling rates, and the analysis method to be used in all cases.

I.105

- Establish federal reporting requirements
 - Update of Public Water System Inventory (PWSI)
 - Summary of PWS violations
 - Report of State enforcement actions
 - Variances and exemptions granted

Reports will provide the federal government with detailed information on water quality within the states. Four reports of the five required are provided by MSIS.

I.106

Review/Exercises

Again, it's time to turn to your workbook for a review exercise.

I.107

**Refer to: I.1.E2
I.1.A2**

When you have completed these exercises check your work with the answer sheet as before.

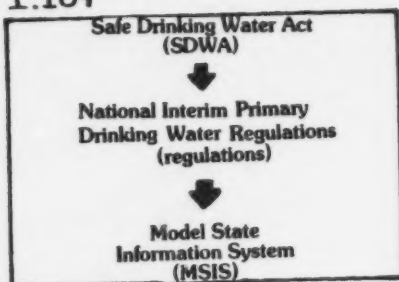
STOP TAPE . . . COMPLETE REVIEW/EXERCISES

I.108

**Unit I
Safe Drinking Water Act
Regulations
Development of MSIS**

Our last topic in Unit I is the development of MSIS.

I.109

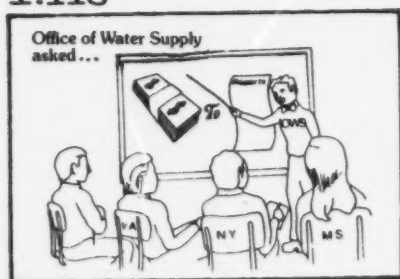


We saw how SDWA led to the regulations. Now we will see how the regulations in turn led to the development of MSIS.

First, the SDWA allocated EPA the responsibility to develop and implement the regulations the act called for.

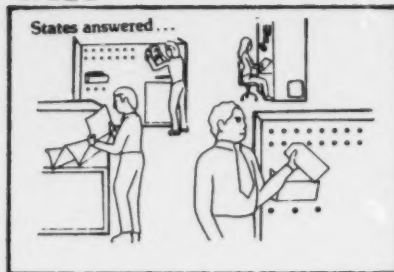
EPA asked their Office of Water Supply to assume direct responsibility as the action agency.

I.110



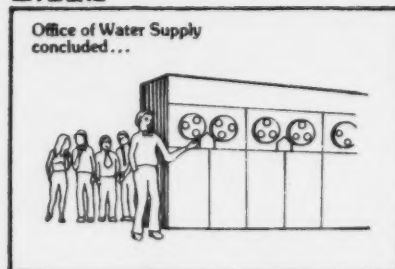
First, OWS conducted a needs assessment. The states were asked how they would use any funds allocated to help them implement the regulations.

I.111



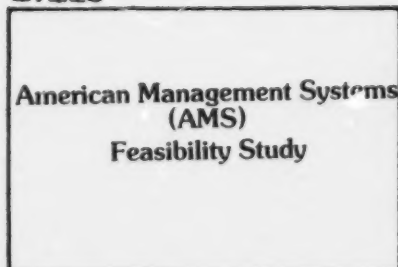
The majority of the states answered that they would use the money to develop a computer system. By doing so, they could produce the required federal reports and also maintain their own records.

I.112



OWS concluded that if most states would use the money allocated to produce a computer system, it would be economically feasible for OWS to use the funds to create one large computer system which would be available to any state.

I.113



OWS then contracted with American Management Systems (AMS) to conduct a feasibility study.

I.114

AMS Feasibility Study

- Centralized system at EPA

One possibility was a centralized system installed at EPA, accessible via remote, state-operated stations.

I.115

AMS Feasibility Study

- Centralized system at EPA
- Centralized system with existing software

Another possibility was a centralized system using STORET, the existing software used to monitor water quality.

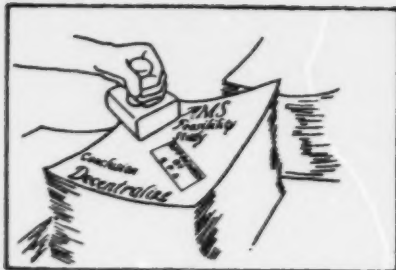
I.116

AMS Feasibility Study

- Centralized system at EPA
- Centralized system with existing software
- Decentralized system

The third option was to install a decentralized system on each state's selected facility.

I.117



The decentralized system was chosen. There were a number of reasons for the decision.

I.118

Decentralized system
States choice
More economical
State content of data
State modifications

The majority of the states liked it better; it was thought to be more economical; states could better maintain the integrity and confidentiality of their data; and finally, each state could incorporate modifications to suit its own needs.

I.119

AMS design
• Conceptual design
• Computerized counterpart

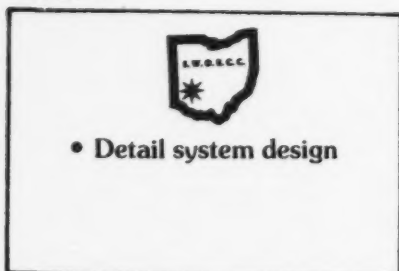
OWS then instructed AMS to provide both a conceptual design and its computerized counterpart, the general design, which came to be called Model State Information System (MSIS).

I.120



At this point, SWORCC began follow-up work for OWS on the MSIS.

I.121



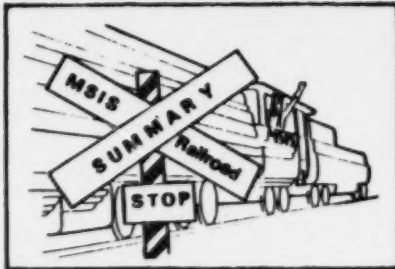
The first major effort was detailed design, programming, testing, and documentation.

I.122



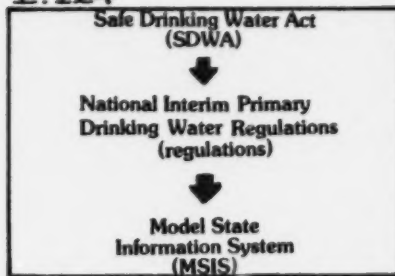
The second major SWORCC effort was to plan the actual installation of the MSIS. This included an assessment of training needs and development of training materials based on those needs.

I.123



That concludes our consideration of Unit I. Let's review briefly.

I.124



To review:

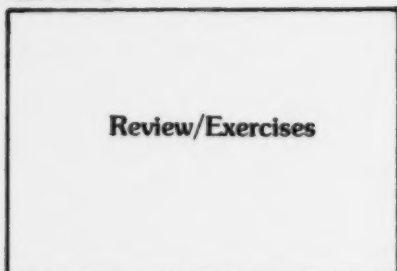
- . SDWA asked EPA to implement the act.
- . Through OWS, EPA developed the regulations.
- . OWS contracted with AMS to do a feasibility study and general design.
- . OWS then contracted with SWORCC to do the detailed design programming, testing and documentation, and installation planning. The end result was MSIS.

I.125



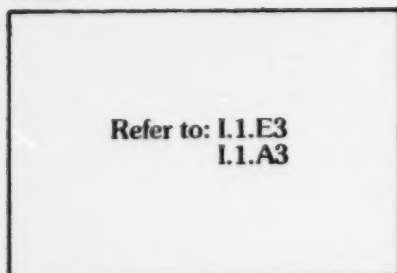
I hope you now have a clear picture of why you are here. In Unit II, I will show you generally how MSIS works.

I.126



It's time once more for you to work alone.

I.127



Please turn to your workbook exercise. Remember to check your work with the answer sheet provided.

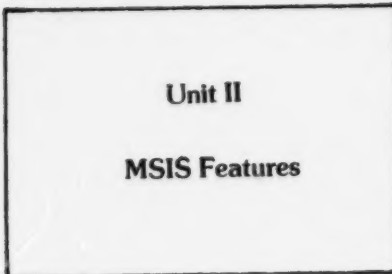
STOP TAPE . . . COMPLETE REVIEW/EXERCISES

CHANGE SLIDE TRAY AND AUDIO CASSETTE

**Volume I
MSIS Overview**

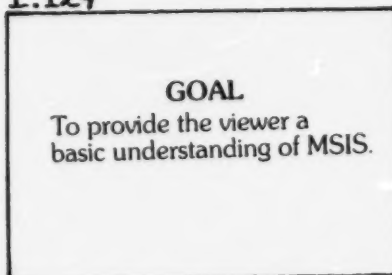
Unit II

I.128



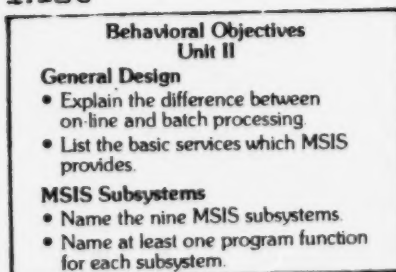
Unit II contains a general discussion of the Model State Information System.

I.129



Its goal is basic understanding, not detailed knowledge. Unit II has these

I.130



behavioral objectives.

These objectives will provide the main focus for the remainder of the material.

I.131

Sequence of Events

- General Design Review/Exercises
- MSIS Subsystems Review/Exercises

There will be two main topics of discussion: general design and subsystems. Notice that you will have an opportunity to do some review work after each topic is discussed.

I.132

General Design

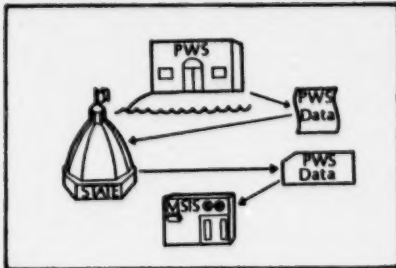
First, what is MSIS? It is a computer system that manages information. Yes, it is an information system.

I.133

- General Design Management Information System

MSIS is a basic management tool which stores information and produces reports in an orderly, accurate, and timely manner.

I.134



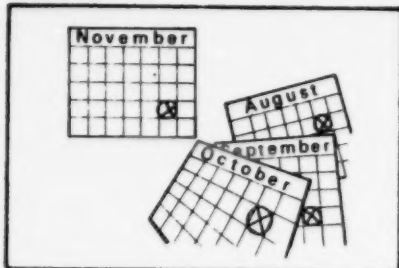
This slide really shows what MSIS is all about. Certainly, it is concerned with information on water quality. The flow of information, starting from your upper left, commences with the public water system collecting information: it forwards this information to the state, which has it keypunched for the computer. Finally, the information is input to MSIS which sorts and stores it and, upon demand, outputs the desired reports.

I.135

- General Design
Management Information
System
System Design

MSIS is designed to handle the flow of information from the PWS and to output reports in an accurate, timely, and orderly fashion. It is a batch computer system, meaning that accumulated data are gathered into groups, or batches, before being input to the MSIS computer program. It was not designed to be an on-line system and in fact will not produce real-time information on public water systems. This is an important concept. Let me illustrate it with an example.

I.136



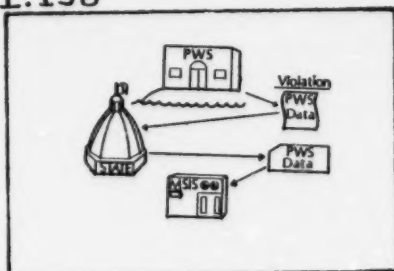
Normally, a public water system reports information to the state for input into MSIS within 40 days of collection. These reports give the state good historical information regarding PWS water quality. MSIS was not intended to be an on-line, instantaneous system. This whole concept is illustrated quite well by looking at how public water system violations are handled.

I.137



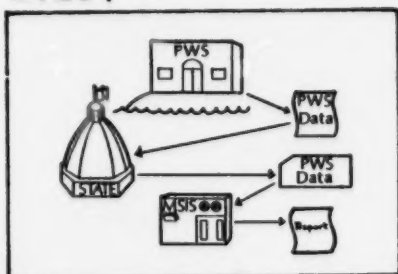
Suppose a public water system receives a violation. Federal regulations require the public water system to notify the state of any violation within two days of its occurrence.

I.138



However, the violation might not be reported to MSIS until forty days later, at which time, of course,

I.139



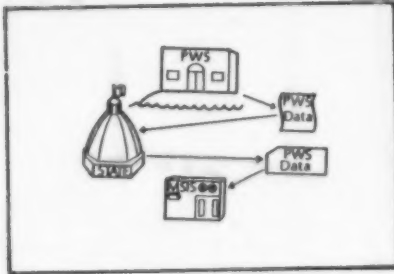
MSIS would output a report indicating that a violation had occurred earlier.

I.140



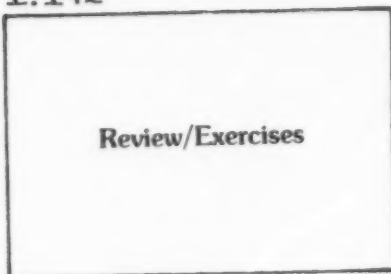
That concludes my remarks on general design. By way of summary, let's review the information flow to MSIS.

I.141



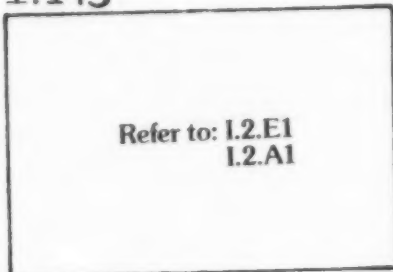
Keep in mind that MSIS is concerned with the orderly storage and reporting of information on all public water systems within the state. The normal process is a leisurely flow of information from the public water system to the state, to MSIS, and then to the federal government.

I.142



Well, it's time to stop once more and let you think about what's been said.

I.143



Work slowly and carefully with your review exercises.

STOP TAPE . . . COMPLETE REVIEW/EXERCISES

Volume I
MSIS Overview

Unit II

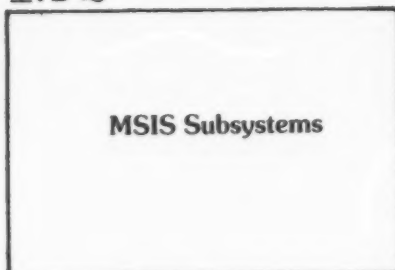
I.144



I hope your work went well on the review session.

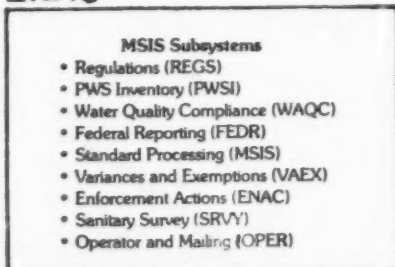
In the last topic we discussed in general what MSIS was designed to do.

I.145



At this time we will discuss the nine subsystems of MSIS.

I.146



Take a few moments to read through this list of the nine subsystems and look at the abbreviations.

Note that each of the abbreviations has four letters.

Don't be confused by the entry that says "MSIS

Standard Processing" and has an abbreviation of MSIS. This subsystem has the same abbreviation as that used for the Model State Information System, and the two should not be confused.

I.147

MSIS Subsystems:

- Base
- Optional

MSIS has two categories of subsystems. All base subsystems must be included when a state takes MSIS. Optional subsystems may be selected as a state sees fit.

I.148

MSIS Base Subsystems

- Regulations (REGS)
- PWS Inventory (PWSI)
- Water Quality Compliance (WAQC)
- Federal Reporting (FEDR)
- Standard Processing (MSIS)

These five subsystems comprise that Base Subsystem. Each will be discussed separately.

I.149

MSIS Base Subsystems
•Regulations (REGS)

The Regulations Subsystem (REGS) establishes a computer version of all the state and federal MCL and sampling regulations concerning public water systems. It stores this information on a file called the Regulations File, where it is readily available when needed.

I.150

MSIS Base Subsystems
•Regulations (REGS)
•PWS Inventory (PWSI)

The Public Water Supply Inventory (PWSI) maintains a master file of all the public water systems found in the state. It updates the master file as necessary and keeps a history of what was added, changed and deleted. Examples of master file data are PWS names and design capacity. PWSI also outputs reports as required.

I.151

MSIS Base Subsystems

- Regulations (REGS)
- PWS Inventory (PWSI)
- Water Quality Compliance (WAQC)

Water Quality Compliance (WAQC) is the heart of MSIS. It keeps records of all the sampling analyses from all state PWS's; it monitors these samples for violations; it schedules future sampling; and, it outputs reports concerned with these activities.

In summary WAQC performs the critical task of determining and reporting violations of the regulations.

I.152

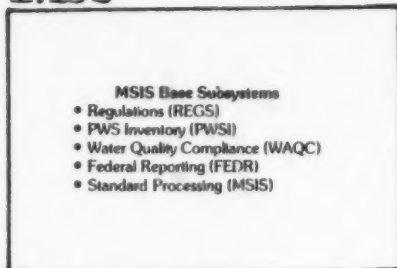
MSIS Base Subsystems

- Regulations (REGS)
- PWS Inventory (PWSI)
- Water Quality Compliance (WAQC)
- Federal Reporting (FEDR)

The Federal Reporting (FEDR) subsystem prepares three of the five reports required by the regulations. They are a record of all additions and corrections to the PWSI, a summary of the violations occurring in the

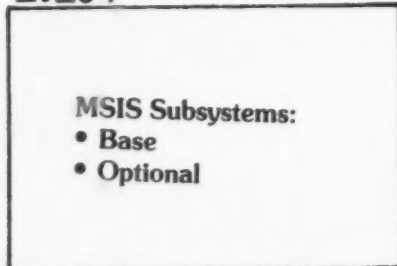
state's PWS's, and the status of variances and exemptions granted.

I.153



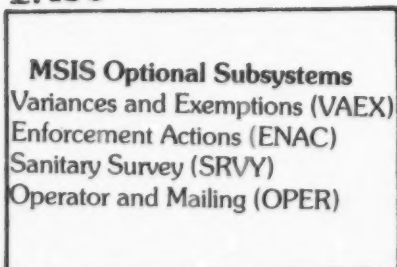
MSIS serves the other subsystems by performing common, repetitive tasks such as printing error messages and maintaining a standard history file.

I.154



We will now examine the optional subsystems.

I.155



The four remaining subsystems of MSIS are all optional. First, let us consider Variances and Exemptions (VAEX).

I.156

MSIS Optional Subsystems
Variances and Exemptions (VAEX)

VAEX has a straightforward job. It maintains records of all variances and exemptions that the state grants its public water systems and outputs the necessary reports on this activity. It supplies the information to FEDR to fulfill the third reporting requirement. If a state does not take VAEX, it has to report the information separately.

I.157

MSIS Optional Subsystems
Variances and Exemptions (VAEX)
Enforcement Actions (ENAC)

The state must enforce the regulations concerning water quality. Enforcement Action (ENAC) creates and maintains a record of the state enforcement actions and outputs reports concerned with enforcement actions, thus fulfilling the fourth reporting requirement. States not selecting ENAC must collect and report this information separately.

I.158

MSIS Optional Subsystems
Variances and Exemptions (VAEX)
Enforcement Actions (ENAC)
Sanitary Survey (SRVY)

The state that selects Sanitary Survey (SRVY) can use it to automatically select PWS's for an in-depth look. SRVY makes these selections based on five state weighted criteria that include size of population served, history of violations, date of last survey, PWS type (community or non-community) and water source.

I.159

MSIS Optional Subsystems
Variances and Exemptions (VAEX)
Enforcement Actions (ENAC)
Sanitary Survey (SRVY)
Operator and Mailing (OPER)

Operator and Mailing (OPER) saves the office staff a lot of work. It does this by creating and updating the names and addresses of public water systems, qualified operators, and others frequently contacted by the state. It also prints out mailing lists and mailing labels as requested.

I.160



That concludes the subsystem considerations.

I.161

MSIS Subsystems

- Base
- Optional

To summarize, let us look again at the base and optional subsystems.

I.162

MSIS Base Subsystems

- Regulations (REGS)
- PWS Inventory (PWSI)
- Water Quality Compliance (WAQC)
- Federal Reporting (FEDR)
- Standard Processing (MSIS)

Some key functions of the base subsystems are to maintain information about all of the states' public water systems and about the quality of water that each furnishes to the public; they use a computerized version of the regulations to determine violations; they output federal reports and they maintain history files.

I.163

MSIS Optional Subsystems
Variances and Exemptions (VAEX)
Enforcement Actions (ENAC)
Sanitary Survey (SRVY)
Operator and Mailing (OPER)

The optional subsystems maintain information about variances and exemptions that the state has granted its PWS's; record state-selected enforcement actions; select PWS's for in-depth examination, and print mailing lists and labels.

I.164

- MSIS Subsystems**
- Regulations (REGS)
 - PWS Inventory (PWSI)
 - Water Quality Compliance (WAQC)
 - Federal Reporting (FEDR)
 - Standard Processing (MSIS)
 - Variances and Exemptions (VAEX)
 - Enforcement Actions (ENAC)
 - Sanitary Survey (SRVY)
 - Operator and Mailing (OPER)

Finally, a look again at all of the nine subsystems.

I.165

Review/Exercises

Once again, it is time to stop and see how much you remember.

I.166

Refer to: I.2.E1
I.2.A1

Your review exercises on the MSIS subsystems are shown here.

STOP TAPE . . . COMPLETE REVIEW/EXERCISES

I.167



I am glad you all remained for the entire trip and hope to see you in II, for the MSIS Subsystems.

Don't forget the post-evaluation for this volume.

I.168

Post Test

I.169

Refer to: I.2.T1

I.1.T1
11T1
(1-4)

PRE-TEST

MSIS OVERVIEW

Name: _____ Postal Code _____ Date _____ / _____ / _____
(5) (30) (31-2) Month Day Year
(33-8)

1. Circle the purpose of the Safe Drinking Water Act:

- (39) a. Monitor drinking water quality
(40) b. Assure the public is provided with safe drinking water
(41) c. Report to the federal government drinking water quality

2. Circle the four primary contaminant categories named in the act:

- (42) a. Chemical (45) d. Metaphysical
(43) b. Taste (46) e. Odor
(44) c. Physical (47) f. Biological
(48) g. Radiological

3. Circle T (True) or F (False) for the following statements:

- T F MSIS is a batch computer system.
(49)
- T F The Regulations define a public water system (PWS) as a water
(50) system supplying drinking water for human consumption to at
least 15 service connections or 25 individuals daily for at
least 120 days per year.
- T F Newly granted variances and exemptions must be reported
(51) annually by the State to EPA.
- T F Additions and corrections to the State's PWS inventory must be
(52) reported by the State annually to EPA.
- T F A summary of enforcement actions is reported promptly by the
(53) State to EPA.
- T F MSIS was developed as a centralized system.
(54)

4. Circle the appropriate answer:

Which of the following is a basic service of MSIS?

- | | |
|-------------------------------------|---|
| (55) a. On-line laboratory analysis | (57) c. Analyzing sanitary survey results |
| (56) b. Sampling water | (58) d. Keeping records |

5. Circle the following abbreviations which are names of MSIS subsystems:

- | | | |
|--------------|--------------|--------------|
| (59) a. REGS | (62) d. BIPS | (65) g. VAEX |
| (60) b. TURB | (63) e. CMCL | (66) h. QUAL |
| (61) c. FEDR | (64) f. WAQC | (67) i. ENAC |

6. Rate your current level of knowledge about MSIS:

- (68) None
- (69) A little
- (70) Some
- (71) Quite a bit
- (72) A great deal

EXERCISES

I.1.E1

Safe Drinking Water Act

1. Define:

Contaminant - _____

Public Water System - _____

Maximum Contaminant Level (MCL) - _____

2. State the four conditions a PWS must meet to be excepted from the regulations. _____

3. What are the three main differences between a variance and an exemption? _____

4. What requirement of the Safe Drinking Water Act does MSIS fulfill? _____

Regulations

1. Define:

PWS - _____

Community PWS - _____

Non-community PWS - _____

2. List three types of requirements in the regulations that can be violated by a PWS. 1. _____

2. _____

3. _____

3. List the four contaminant categories. 1. _____

2. _____ 3. _____ 4. _____

4. List the five federal reporting requirements of the regulations.

Developing MSIS

1. Name one reason why the federal government developed MSIS for the States.

2. Name at least one reason why the system is decentralized.

MSIS Design and Services

1. Explain the difference between on-line and batch processing. _____

2. List the two basic services which MSIS provides.

3. What machine-readable reports does MSIS provide for the States to submit to the federal government? _____

MSIS Subsystems

1. Name the nine subsystems of MSIS.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

2. Name at least one function for each subsystem.

Safe Drinking Water Act

1. Define:

Contaminant - any physical, chemical, biological, or radiological substance or matter in water. (1401.6)

Public Water System (PWS) - a system for the provision of piped water to the public for human consumption which has at least 15 service connections or regularly serves at least 25 individuals. (1401.4)

Maximum Contaminant Level (MCL) - the maximum permissible level of a contaminant in water which is delivered to any user of a PWS. (1401.3)

2. State the four conditions a PWS must meet to be excepted from the regulations. 1. consists only of distribution and storage facilities (no collection or treatment facilities), 2. obtains water from another PWS to which the regulations apply, 3. does not sell water, 4. is not a carrier of interstate passengers.
3. What are the three main differences between a variance and an exemption? 1. An exemption applies only to an existing PWS; no exemptions will be permitted to future PWSs. 2. Exemptions are basically granted when a PWS cannot afford generally available treatment techniques, whereas variances are granted when the raw water is unusually poor and the generally available treatment techniques are used and do not reduce the contaminant level below the MCL. 3. An exemption will expire in 1981 and may be renewed for two more years, but a variance has no time limit.
4. What requirement of the Safe Drinking Water Act does MSIS fulfill? It keeps records and provides reports for the federal government.

Regulations

1. Define:

PWS - a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year.

Community PWS - a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Non-community PWS - all other public water systems.

2. List three types of requirements in the regulations that can be violated by a PWS.

1. Maximum contaminant levels.

2. Monitoring requirements.

3. Reporting to the State.

3. List the four contaminant categories. 1. chemical

2. physical 3. microbiological 4. radiological

4. List the five federal reporting requirements of the regulations.

1. additions or corrections to the State's inventory of PWSs annually.

2. a summary of violations by public water systems, annually.

3. a summary of enforcement actions, annually.

4. a summary of the status of variances and exemptions, annually.

5. the granting of a variance or exemption, promptly.

Developing MSIS

1. Name one reason why the federal government developed MSIS for the States.
 1. the funds for administering the SDWA would be used in a way that the majority of States desired, i.e., to develop a computer system.
 2. the combined funds could develop a better system.
 3. the system would be uniform with standard output to be sent to the federal government.
2. Name at least one reason why the system is decentralized.
 1. it was the States' preferred method.
 2. it would be more economical.
 3. it would give the State more control of the integrity of the data in their system.
 4. it would better assure confidentiality of State data, and
 5. it would allow the State to modify the system for its own individual circumstances.

MSIS Design and Services

1. Explain the difference between on-line and batch processing.
Batch processing means that batches of data are input weekly or monthly,
whereas on-line processing means that data are input hourly or more
frequently.
2. List the two basic services which MSIS provides.
 1. It keeps records.
 2. It provides reports.
3. What reports does MSIS provide for the States to submit to the federal government?
 1. additions or corrections to the State's inventory of PWSs of the
national primary drinking water regulations.
 2. a summary of violations by public water systems.
 3. a summary of enforcement actions taken by the State.
 4. a summary of the status of each variance and exemption in effect
during any part of the calendar year.

MSIS Subsystems

1. Name the nine subsystems of MSIS.

1. Regulations (REGS)
2. Public Water System Inventory (PWSI)
3. Water Quality Compliance (WAQC)
4. Federal Reporting (FEDR)
5. Standard Processing (MSIS)
6. Variances and Exemptions (VAEX)
7. Enforcement Actions (ENAC)
8. Sanitary Survey (SRVY)
9. Operator and Mailing (OPER)

2. Name at least one function for each subsystem.

REGS maintains a computer version of the federal and State regulations.

PWSI maintains descriptive data on each PWS in the State.

WAQC maintains sample and analysis data, determines violations, and schedules sampling.

FEDR prepares machine-readable output that is used to satisfy three of the federal reporting requirements.

MSIS performs functions for the other subsystems such as keeping history records and printing error reports.

ENAC maintains records on the actions taken by the State to enforce the Act when violations have been identified.

VAEX maintains records of variances and exemptions granted and their status.

SRVY provides a computer technique for selecting PWSs for sanitary survey.

OPER maintains a file of names and addresses for producing mailing labels and lists.

I.2.T1
12T1
(1-4)

POST-TEST

MSIS OVERVIEW

Name: _____ Postal Code _____ Date ____/____/____
(5) (30) (31-2) Month Day Year
(33-8)

1. Circle the purpose of the Safe Drinking Water Act:

- (39) a. Monitor drinking water quality
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- T F MSIS was developed as a centralized system.
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| (56) b. Sampling water | (58) d. Keeping records |

5. Circle the following abbreviations which are names of MSIS subsystems:

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|--------------|--------------|--------------|
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| (60) b. TURB | (63) e. CMCL | (66) h. QUAL |
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6. Rate your current level of knowledge about MSIS:

- (68) None
(69) A little
(70) Some
(71) Quite a bit
(72) A great deal

GLOSSARY

Terms are included in this glossary only if their meanings differ from those found in a standard English language dictionary.

Analysis:

The separation of any abstract entity or material into its constituent elements, such as chemical-intentionally produced decomposition or separation of materials into their ingredients to find their kind or quality.

Analysis Method:

The method or technique utilized to obtain analysis results.

Analytical Techniques:

The methods used to determine the components of a substance, especially raw water.

Batch Processing:

A procedure in which a number of transactions, for example on keypunched cards, are accumulated before being processed together.

Check Sampling:

The act of acquiring additional quantities of water for analysis over and above the regular samples due to the suspicion of violating maximum contaminant levels.

Code:

A system used for brevity of communication in which arbitrarily chosen words, letters, or symbols are assigned definite meanings.

Computer:

A machine which accepts input data, processes it, and gives output data.

Computer Program:

A sequence of computer-readable instructions used in conjunction with appropriate data to perform specified logical tasks.

Correction:

Additions, subtractions, or changes to a computer file.

Course:

All content taught in one individual MSIS training program volume.
A course is subdivided into units.

Data:

Raw facts or statistics which alone have little or no meaning,
but as a group allow some meaningful relationships to be drawn.

Data Element:

An identifiable item of information within a record. See the Data
Element Dictionary for all data elements used in MSIS.

Data Processing:

The act of manipulating information to obtain a desired result,
especially with the use of a computer.

Economical:

Of or pertaining to the financial reasons for granting variances
and exemptions.

Enforcement:

The act of creating and maintaining compliance using coercive
methods.

Enforcement Action:

An act intended to generate compliance.

Exemption:

Authorized waiver of an MCL requirement due to compelling factors,
such as need for a PWS to design and build effective treatment
facilities.

Field:

See data element.

File:

A collection of records systematically arranged to facilitate quick reference; may be stored on magnetic tape or magnetic disc.

Goal:

A general achievement toward which effort is directed.

Gross Alpha:

A group of substances which emit Alpha particle radiation.

Gross Beta:

A group of substances which emit Beta particle radiation.

Hardware:

The physical equipment in a data processing system (contrasted with software).

Information:

Data that has been processed to obtain specific results which increase knowledge of the recipient and is used as the basis for decision making.

Inorganic:

Of or pertaining to substances that are not hydrocarbons or their derivatives.

Input:

Information which is specially prepared for acceptance by computer programs. Usually written down on special forms, then put into machine-readable form by, for example, keypunching.

Integrity:

Presumed reliability of data.

Internal:

Data processing occurring within the computer automatically according to instructions from computer programs.

Inventory:

A detailed, descriptive list, for example, of Public Water Systems.

Magnetic Disc:

A device which stores data on the magnetizable surfaces of one or more rotating discs, which look like a stack of phonograph records.

Magnetic tape:

A device which stores data on the magnetizable surface of a long strip of tape (the tape is typically 1 inch wide and 2400 feet long).

Maintain:

Actions taken to ensure up-to-date computer files.

Management Information System:

An organized method of maintaining facts pertinent to the governing of the operations of an organization.

Model State Information System:

(MSIS) a batch computer system designed to (1) maintain records on public water systems and the quality of the water they supply, and (2) prepare reports.

Monitor:

The acts of (1) a PWS observing and checking water quality or (2) a State observing and checking PWSs.

National Inventory File:

A computerized list of many public water systems in the United States; previously used to monitor water quality.

Objective:

A specific achievement that efforts are intended to attain.

Online Processing:

A procedure for inputting data computer whenever needed for immediate data processing, often by typewriter terminal.

Operator:

One who runs a public water system.

Organic:

Of or pertaining to substances that are hydrocarbons or their derivatives.

Output:

Any information passed from the computer.

Primacy:

Primary enforcement responsibility for carrying out the Safe Drinking Water Act of 1974.

Public Water System (PWS):

A set of components for the provision of piped water to persons for human consumption, if such facility has at least fifteen service connections or regularly serves at least twenty-five individuals 60 or more days per year.

Purge:

To remove from a computer those items no longer desired.

Raw Water:

Water at the source before any treatment.

Record:

A logical group of data elements.

Regulations:

Rules created by EPA within the guidelines established by the SDWA and having the same authority.

Report:

Information formatted by the computer in either human-readable form (such as a printed report) or machine-readable form (such as a magnetic tape).

Sample:

A portion of the whole to represent the whole, especially water.

Sanitary Survey:

An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system for the purpose of evaluating the adequacy of such source for producing and distributing safe drinking water.

Selection Process:

The method used by MSIS for selecting information from a computer file for use in a report. Many different criteria can be used in the selection of the data.

Software:

The computer programs required for the computer to work.

Subsystem:

A subset of the MSIS computer system. There are nine MSIS subsystems.

System:

A method or methods of accomplishing a function or functions, especially with a computer.

Table:

A computer file of brief information usually set up in logical relationships to permit quick access, often on magnetic disc.

Turnaround Document:

A form containing computer-printed information which needs additional information written on it; called "turnaround" since it is both an output and an input.

Unit:

A subset of teaching material within a course.

Variance:

Authorized deviation from an applicable national drinking water regulation because characteristics of the raw water source cannot be corrected by available means.

List of Abbreviations

<u>Abbreviation</u>	<u>Meaning</u>
BIP	Background Informational Package
CVT	Code Value Table
DET	Data Element Table
DVF	Deviations File
EAF	Enforcement Actions File
EMT	Error Message Table
ENAC	Enforcement Actions Subsystem
EPA	Environmental Protection Agency
FEDR	Federal Reporting Subsystem
LBT	Laboratory Table
MCL	Maximum Contaminant Level
MSIS	Model State Information System; also MSIS Standard Processing Subsystem
NIF	National Inventory File
NIPDWR	National Interim Primary Drinking Water Regulations
OMF	Operator and Mailing File
OPER	Operator and Mailing Subsystem
OWS	Office of Water Supply
PSF	Periodic Sample and Analysis File
PWF	Public Water System File
PWS	Public Water System
PWSI	Public Water System Inventory Subsystem
PWT	Public Water System Table
REGS	Regulations Subsystem

RGF	Regulations File
SAF	Sample and Analysis File
SDWA	Safe Drinking Water Act
SHF	MSIS Standard History File
SRVY	Sanitary Survey Subsystem
VAEX	Variances and Exemptions Subsystem
VEF	Variances and Exemptions File
VIF	Violations File
WAQC	Water Quality Compliance Subsystem

EXTRACTS FROM
MSIS DOCUMENTS



Public Law 93-523
93rd Congress, S. 433
December 16, 1974

An Act

To amend the Public Health Service Act to assure that the public is provided with safe drinking water, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Safe Drinking
Water Act.

SHORT TITLE

SECTION 1. This Act may be cited as the "Safe Drinking Water Act".

42 USC 300f.
note.

PUBLIC WATER SYSTEMS

SEC. 2. (a) The Public Health Service Act is amended by inserting after title XIII the following new title:

42 USC 201
note.
88 STAT. 1660
88 STAT. 1661

"TITLE XIV—SAFETY OF PUBLIC WATER SYSTEMS

"PART A—DEFINITIONS

"DEFINITIONS

"SEC. 1401. For purposes of this title:

42 USC 300f.

"(1) The term 'primary drinking water regulation' means a regulation which—

"(A) applies to public water systems;

"(B) specifies contaminants which, in the judgment of the Administrator, may have any adverse effect on the health of persons;

"(C) specifies for each such contaminant either—

"(i) a maximum contaminant level, if, in the judgment of the Administrator, it is economically and technologically feasible to ascertain the level of such contaminant in water in public water systems, or

"(ii) if, in the judgment of the Administrator, it is not economically or technologically feasible to so ascertain the level of such contaminant, each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412; and

"(D) contains criteria and procedures to assure a supply of drinking water which dependably complies with such maximum contaminant levels; including quality control and testing procedures to insure compliance with such levels and to insure proper operation and maintenance of the system, and requirements as to (i) the minimum quality of water which may be taken into the system and (ii) siting for new facilities for public water systems.

Post, p. 1662.

"(2) The term 'secondary drinking water regulation' means a regulation which applies to public water systems and which specifies the maximum contaminant levels which, in the judgment of the Administrator, are requisite to protect the public welfare. Such regulations may apply to any contaminant in drinking water (A) which may adversely affect the odor or appearance of such water and consequently may cause a substantial number of the persons served by the public water system providing such water to discontinue its use, or (B) which may otherwise adversely affect the public welfare. Such regulations may vary according to geographic and other circumstances.

"(3) The term 'maximum contaminant level' means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

88 STAT. 1661
88 STAT. 1662

"(4) The term 'public water system' means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals. Such term includes (A) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (B) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system.

"(5) The term 'supplier of water' means any person who owns or operates a public water system.

"(6) The term 'contaminant' means any physical, chemical, biological, or radiological substance or matter in water.

"(7) The term 'Administrator' means the Administrator of the Environmental Protection Agency.

"(8) The term 'Agency' means the Environmental Protection Agency.

"(9) The term 'Council' means the National Drinking Water Advisory Council established under section 1446.

"(10) The term 'municipality' means a city, town, or other public body created by or pursuant to State law, or an Indian tribal organization authorized by law.

"(11) The term 'Federal agency' means any department, agency, or instrumentality of the United States.

"(12) The term 'person' means an individual, corporation, company, association, partnership, State, or municipality.

"PART B—PUBLIC WATER SYSTEMS

"COVERAGE

42 USC 300g.

"Sec. 1411. Subject to sections 1415 and 1416, national primary drinking water regulations under this part shall apply to each public water system in each State; except that such regulations shall not apply to a public water system—

"(1) which consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

"(2) which obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;

"(3) which does not sell water to any person; and

"(4) which is not a carrier which conveys passengers in interstate commerce.

"NATIONAL DRINKING WATER REGULATIONS

42 USC 300g-1.

"Sec. 1412. (a)(1) The Administrator shall publish proposed national interim primary drinking water regulations within 90 days after the date of enactment of this title. Within 180 days after such date of enactment, he shall promulgate such regulations with such modifications as he deems appropriate. Regulations under this paragraph may be amended from time to time.

"(2) National interim primary drinking water regulations promulgated under paragraph (1) shall protect health to the extent feasible, using technology, treatment techniques, and other means, which the Administrator determines are generally available (taking costs into consideration) on the date of enactment of this title.

88 STAT. 1662

"(3) The interim primary regulations first promulgated under paragraph (1) shall take effect eighteen months after the date of their promulgation.

88 STAT. 1663

"(b)(1)(A) Within 10 days of the date the report on the study conducted pursuant to subsection (e) is submitted to Congress, the Administrator shall publish in the Federal Register, and provide opportunity for comment on, the—

Publication in
Federal Register.

"(i) proposals in the report for recommended maximum contaminant levels for national primary drinking water regulations, and

"(ii) list in the report of contaminants the levels of which in drinking water cannot be determined but which may have an adverse effect on the health of persons.

"(B) Within 90 days after the date the Administrator makes the publication required by subparagraph (A), he shall by rule establish recommended maximum contaminant levels for each contaminant which, in his judgment based on the report on the study conducted pursuant to subsection (e), may have any adverse effect on the health of persons. Each such recommended maximum contaminant level shall be set at a level at which, in the Administrator's judgment based on such report, no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety. In addition, he shall, on the basis of the report on the study conducted pursuant to subsection (e), list in the rules under this subparagraph any contaminant the level of which cannot be accurately enough measured in drinking water to establish a recommended maximum contaminant level and which may have any adverse effect on the health of persons. Based on information available to him, the Administrator may by rule change recommended levels established under this subparagraph or change such list.

Recommended maximum
contaminant
levels.

"(2) On the date the Administrator establishes pursuant to paragraph (1)(B) recommended maximum contaminant levels he shall publish in the Federal Register proposed revised national primary drinking water regulations (meeting the requirements of paragraph (3)). Within 180 days after the date of such proposed regulations, he shall promulgate such revised drinking water regulations with such modifications as he deems appropriate.

Publication in
Federal Register.

"(3) Revised national primary drinking water regulations promulgated under paragraph (2) of this subsection shall be primary drinking water regulations which specify a maximum contaminant level or require the use of treatment techniques for each contaminant for which a recommended maximum contaminant level is established or which is listed in a rule under paragraph (1)(B). The maximum contaminant level specified in a revised national primary drinking water regulation for a contaminant shall be as close to the recommended maximum contaminant level established under paragraph (1)(B) for such contaminant as is feasible. A required treatment technique for a contaminant for which a recommended maximum contaminant level has been established under paragraph (1)(B) shall reduce such contaminant to a level which is as close to the recommended maximum contaminant level for such contaminant as is feasible. A required treatment technique for a contaminant which is listed under paragraph (1)(B) shall

"Feasible."

require treatment necessary in the Administrator's judgment to prevent known or anticipated adverse effects on the health of persons to the extent feasible. For purposes of this paragraph, the term 'feasible' means feasible with the use of the best technology, treatment techniques, and other means, which the Administrator finds are generally available (taking cost into consideration).

"(4) Revised national primary drinking water regulations shall be amended whenever changes in technology, treatment techniques, and other means permit greater protection of the health of persons, but in any event such regulations shall be reviewed at least once every 3 years.

"(5) Revised national primary drinking water regulations promulgated under this subsection (and amendments thereto) shall take effect eighteen months after the date of their promulgation. Regulations under subsection (a) shall be superseded by regulations under this subsection to the extent provided by the regulations under this subsection.

"(6) No national primary drinking water regulation may require the addition of any substance for preventive health care purposes unrelated to contamination of drinking water.

Proposed national secondary drinking water regulations, publication.

"(c) The Administrator shall publish proposed national secondary drinking water regulations within 270 days after the date of enactment of this title. Within 90 days after publication of any such regulation, he shall promulgate such regulation with such modifications as he deems appropriate. Regulations under this subsection may be amended from time to time.

Hearing.

"(d) Regulations under this section shall be prescribed in accordance with section 553 of title 5, United States Code (relating to rule-making), except that the Administrator shall provide opportunity for public hearing prior to promulgation of such regulations. In proposing and promulgating regulations under this section, the Administrator shall consult with the Secretary and the National Drinking Water Advisory Council.

Study.

"(e) (1) The Administrator shall enter into appropriate arrangements with the National Academy of Sciences (or with another independent scientific organization if appropriate arrangements cannot be made with such Academy) to conduct a study to determine (A) the maximum contaminant levels which should be recommended under subsection (b) (2) in order to protect the health of persons from any known or anticipated adverse effects, and (B) the existence of any contaminants the levels of which in drinking water cannot be determined but which may have an adverse effect on the health of persons.

Report to Congress.

"(2) The result of the study shall be reported to Congress no later than 2 years after the date of enactment of this title. The report shall contain (A) a summary and evaluation of relevant publications and unpublished studies; (B) a statement of methodologies and assumptions for estimating the levels at which adverse health effects may occur; (C) a statement of methodologies and assumptions for estimating the margin of safety which should be incorporated in the national primary drinking water regulations; (D) proposals for recommended maximum contaminant levels for national primary drinking water regulations, based on the methodologies, assumptions, and studies referred to in clauses (A), (B), and (C) and in paragraph (4); (E) a list of contaminants the level of which in drinking water cannot be determined but which may have an adverse effect on the health of persons; and (F) recommended studies and test protocols for future research on the health effects of drinking water contaminants, including a list of the major research priorities and estimated costs necessary to conduct such priority research.



"(3) In developing its proposals for recommended maximum contaminant levels under paragraph (2)(D) the National Academy of Sciences (or other organization preparing the report) shall evaluate and explain (separately and in composite) the impact of the following considerations:

"(A) The existence of groups or individuals in the population which are more susceptible to adverse effects than the normal healthy adult.

"(B) The exposure to contaminants in other media than drinking water (including exposures in food, in the ambient air, and in occupational settings) and the resulting body burden of contaminants.

"(C) Synergistic effects resulting from exposure to or interaction by two or more contaminants.

"(D) The contaminant exposure and body burden levels which alter physiological function or structure in a manner reasonably suspected of increasing the risk of illness.

"(4) In making the study under this subsection, the National Academy of Sciences (or other organization) shall collect and correlate (A) morbidity and mortality data and (B) monitored data on the quality of drinking water. Any conclusions based on such correlation shall be included in the report of the study.

"(5) Neither the report of the study under this subsection nor any draft of such report shall be submitted to the Office of Management and Budget or to any other Federal agency (other than the Environmental Protection Agency) prior to its submission to Congress. Report, submitted to OMB.

"(6) Of the funds authorized to be appropriated to the Administrator by this title, such amounts as may be required shall be available to carry out the study and to make the report directed by paragraph (2) of this subsection. Funds.

'STATE PRIMARY ENFORCEMENT RESPONSIBILITY

"SEC. 1413. (a) For purposes of this title, a State has primary enforcement responsibility for public water systems during any period for which the Administrator determines (pursuant to regulations prescribed under subsection (b)) that such State— 42 USC 300g-2.

"(1) has adopted drinking water regulations which (A) in the case of the period beginning on the date the national interim primary drinking water regulations are promulgated under section 1412 and ending on the date such regulations take effect are no less stringent than such regulations, and (B) in the case of the period after such effective date are no less stringent than the interim and revised national primary drinking water regulations in effect under such section;

"(2) has adopted and is implementing adequate procedures for the enforcement of such State regulations, including conducting such monitoring and making such inspections as the Administrator may require by regulation;

"(3) will keep such records and make such reports with respect to its activities under paragraphs (1) and (2) as the Administrator may require by regulation;

"(4) if it permits variances or exemptions, or both, from the requirements of its drinking water regulations which meet the requirements of paragraph (1), permits such variances and exemptions under conditions and in a manner which is not less stringent than the conditions under, and the manner in, which variances and exemptions may be granted under sections 1415 and 1416; and

- Regulations. " (5) has adopted and can implement an adequate plan for the provision of safe drinking water under emergency circumstances.
- " (b) (1) The Administrator shall, by regulation (proposed within 180 days of the date of the enactment of this title), prescribe the manner in which a State may apply to the Administrator for a determination that the requirements of paragraphs (1), (2), (3), and (4) of subsection (a) are satisfied with respect to the State, the manner in which the determination is made, the period for which the determination will be effective, and the manner in which the Administrator may determine that such requirements are no longer met. Such regulations shall require that before a determination of the Administrator that such requirements are met or are no longer met with respect to a State may become effective, the Administrator shall notify such State of the determination and the reasons therefor and shall provide an opportunity for public hearing on the determination. Such regulations shall be promulgated (with such modifications as the Administrator deems appropriate) within 90 days of the publication of the proposed regulations in the Federal Register. The Administrator shall promptly notify in writing the chief executive officer of each State of the promulgation of regulations under this paragraph. Such notice shall contain a copy of the regulations and shall specify a State's authority under this title when it is determined to have primary enforcement responsibility for public water systems.
- Notice and hearing.
Publication in Federal Register.
Notice.
- Applications. " (2) When an application is submitted in accordance with the Administrator's regulations under paragraph (1), the Administrator shall within 90 days of the date on which such application is submitted (A) make the determination applied for, or (B) deny the application and notify the applicant in writing of the reasons for his denial.

"FAILURE BY STATE TO ASSURE ENFORCEMENT OF DRINKING WATER
REGULATIONS

- 42 USC 300g-3. "SEC. 1414. (a) (1) (A) Whenever the Administrator finds during a period during which a State has primary enforcement responsibility for public water systems (within the meaning of section 1413(a)) that any public water system—
- " (i) for which a variance under section 1415 or an exemption under section 1416 is not in effect, does not comply with any national primary drinking water regulation in effect under section 1412, or
- " (ii) for which a variance under section 1415 or an exemption under section 1416 is in effect, does not comply with any schedule or other requirement imposed pursuant thereto,
- Notice. he shall so notify the State and provide such advice and technical assistance to such State and public water system as may be appropriate to bring the system into compliance with such regulation or requirement by the earliest feasible time.
- " (B) If the Administrator finds such failure to comply extends beyond the thirtieth day after the date of the notice given pursuant to subparagraph (A), he shall give public notice of such finding and request the State to report within fifteen days from the date of such public notice as to the steps being taken to bring the system into compliance (including reasons for anticipated steps to be taken to bring the system into compliance and for any failure to take steps to bring the system into compliance). If—
- Notice.
- Civil action. " (i) such failure to comply extends beyond the sixtieth day after the date of the notice given pursuant to subparagraph (A): and

"(ii)(a) the State fails to submit the report requested by the Administrator within the time period prescribed by the preceding sentence; or

"(β) the State submits such report within such period but the Administrator, after considering the report, determines that the State abused its discretion in carrying out primary enforcement responsibility for public water systems by both—

"(I) failing to implement by such sixtieth day adequate procedures to bring the system into compliance by the earliest feasible time, and

"(II) failing to assure by such day the provision through alternative means of safe drinking water by the earliest feasible time;

the Administrator may commence a civil action under subsection (b).

"(2) Whenever, on the basis of information available to him, the Administrator finds during a period during which a State does not have primary enforcement responsibility for public water systems that a public water system in such State—

"(A) for which a variance under section 1415(a)(2) or an exemption under section 1416(f) is not in effect, does not comply with any national primary drinking water regulation in effect under section 1412, or

"(B) for which a variance under section 1415(a)(2) or an exemption under section 1416(f) is in effect, does not comply with any schedule or other requirement imposed pursuant thereto,

he may commence a civil action under subsection (b).

"(b) The Administrator may bring a civil action in the appropriate United States district court to require compliance with a national primary drinking water regulation or with any schedule or other requirement imposed pursuant to a variance or exemption granted under section 1415 or 1416 if—

"(1) authorized under paragraph (1) or (2) of subsection (a), or

"(2) if requested by (A) the chief executive officer of the State in which is located the public water system which is not in compliance with such regulation or requirement, or (B) the agency of such State which has jurisdiction over compliance by public water systems in the State with national primary drinking water regulations or State drinking water regulations.

The court may enter, in an action brought under this subsection, such judgment as protection of public health may require, taking into consideration the time necessary to comply and the availability of alternative water supplies; and, if the court determines that there has been a willful violation of the regulation or schedule or other requirement with respect to which the action was brought, the court may, taking into account the seriousness of the violation, the population at risk, and other appropriate factors, impose on the violator a civil penalty of not to exceed \$5,000 for each day in which such violation occurs.

"(c) Each owner or operator of a public water system shall give notice to the persons served by it—

"(1) of any failure on the part of the public water system to—

"(A) comply with an applicable maximum contaminant level or treatment technique requirement of, or a testing procedure prescribed by, a national primary drinking water regulation, or

- "(B) perform monitoring required by section 1445(a), and
- "(2) if the public water system is subject to a variance granted under section 1415(a)(1)(A) or 1415(a)(2) for an inability to meet a maximum contaminant level requirement or is subject to an exemption granted under section 1416, of—
- "(A) the existence of such variance or exemption, and
- "(B) any failure to comply with the requirements of any schedule prescribed pursuant to the variance or exemption.
- Regulations.** The Administrator shall by regulation prescribe the form and manner for giving such notice. Such notice shall be given not less than once every 3 months, shall be given by publication in a newspaper of general circulation serving the area served by each such water system (as determined by the Administrator), shall be furnished to the other communications media serving such area, and shall be furnished to the communications media as soon as practicable after the discovery of the violation with respect to which the notice is required. If the water bills of a public water system are issued more often than once every 3 months, such notice shall be included in at least one water bill of the system every 3 months, and if a public water system issues its water bills less often than once every 3 months, such notice shall be included in each of the water bills issued by the system. Any person who willfully violates this subsection or regulations thereunder shall be fined not more than \$5,000.
- Penalty.** " (d) Whenever, on the basis of information available to him, the Administrator finds that within a reasonable time after national secondary drinking water regulations have been promulgated, one or more public water systems in a State do not comply with such secondary regulations, and that such noncompliance appears to result from a failure of such State to take reasonable action to assure that public water systems throughout such State meet such secondary regulations, he shall so notify the State.
- Notice.** " (e) Nothing in this title shall diminish any authority of a State or political subdivision to adopt or enforce any law or regulation respecting drinking water regulations or public water systems, but no such law or regulation shall relieve any person of any requirement otherwise applicable under this title.
- " (f) If the Administrator makes a finding of noncompliance (described in subparagraph (A) or (B) of subsection (a)(1)) with respect to a public water system in a State which has primary enforcement responsibility, the Administrator may, for the purpose of assisting that State in carrying out such responsibility and upon the petition of such State or public water system or persons served by such system, hold, after appropriate notice, public hearings for the purpose of gathering information from technical or other experts, Federal, State, or other public officials, representatives of such public water system, persons served by such system, and other interested persons on—
- " (1) the ways in which such system can within the earliest feasible time be brought into compliance with the regulation or requirement with respect to which such finding was made, and
- " (2) the means for the maximum feasible protection of the public health during any period in which such system is not in compliance with a national primary drinking water regulation or requirement applicable to a variance or exemption.
- On the basis of such hearings the Administrator shall issue recommendations which shall be sent to such State and public water system and shall be made available to the public and communications media.
- Notice and public hearings.**

"VARIANCES

"SEC. 1415. (a) Notwithstanding any other provision of this part, 42 USC 300g-4, variances from national primary drinking water regulations may be granted as follows:

"(1) (A) A State which has primary enforcement responsibility for public water systems may grant one or more variances from an applicable national primary drinking water regulation to one or more public water systems within its jurisdiction which, because of characteristics of the raw water sources which are reasonably available to the systems, cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulation despite application of the best technology, treatment techniques, or other means, which the Administrator finds are generally available (taking costs into consideration). Before a State may grant a variance under this subparagraph, the State must find that the variance will not result in an unreasonable risk to health. If a State grants a public water system a variance under this subparagraph, the State shall prescribe within one year of the date the variance is granted, a schedule for—

"(i) compliance (including increments of progress) by the public water system with each contaminant level requirement with respect to which the variance was granted, and

"(ii) implementation by the public water system of such control measures as the State may require for each contaminant, subject to such contaminant level requirement, during the period ending on the date compliance with such requirement is required.

Before a schedule prescribed by a State pursuant to this subparagraph may take effect, the State shall provide notice and opportunity for a public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the prescribing of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice. A schedule prescribed pursuant to this subparagraph for a public water system granted a variance shall require compliance by the system with each contaminant level requirement with respect to which the variance was granted as expeditiously as practicable (as the State may reasonably determine).

Notice and hearing.

"(B) A State which has primary enforcement responsibility for public water systems may grant to one or more public water systems within its jurisdiction one or more variances from any provision of a national primary drinking water regulation which requires the use of a specified treatment technique with respect to a contaminant if the public water system applying for the variance demonstrates to the satisfaction of the State that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system. A variance granted under this subparagraph shall be conditioned on such monitoring and other requirements as the Administrator may prescribe.

"(C) Before a variance proposed to be granted by a State under subparagraph (A) or (B) may take effect, such State shall provide notice and opportunity for public hearing on the proposed variance. A notice given pursuant to the preceding sentence may cover the granting of more than one variance and a hearing held pursuant to such notice shall include each of the variances covered by the notice. The State shall promptly notify the Administrator

Notice and hearing.

Notice to Administrator.

88 STAT. 1670

Compliance;
enforcement.

Review of
variances and
schedules.

Publication in
Federal Regis-
ter.

Publication in
Federal Regis-
ter.

Notice to
State.

of all variances granted by it. Such notification shall contain the reason for the variance (and in the case of a variance under subparagraph (A), the basis for the finding required by that subparagraph before the granting of the variance) and documentation of the need for the variance.

"(D) Each public water system's variance granted by a State under subparagraph (A) shall be conditioned by the State upon compliance by the public water system with the schedule prescribed by the State pursuant to that subparagraph. The requirements of each schedule prescribed by a State pursuant to that subparagraph shall be enforceable by the State under its laws. Any requirement of a schedule on which a variance granted under that subparagraph is conditioned may be enforced under section 1414 as if such requirement was part of a national primary drinking water regulation.

"(E) Each schedule prescribed by a State pursuant to subparagraph (A) shall be deemed approved by the Administrator unless the variance for which it was prescribed is revoked by the Administrator under subparagraph (G) or the schedule is revised by the Administrator under such subparagraph.

"(F) Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the variances granted under subparagraph (A) (and schedules prescribed pursuant thereto) and under subparagraph (B) by the States during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of variances and schedules as he deems necessary to carry out the purposes of this title, but each subsequent review shall be completed within each 3-year period following the completion of the first review under this subparagraph. Before conducting any review under this subparagraph, the Administrator shall publish notice of the proposed review in the Federal Register. Such notice shall (i) provide information respecting the location of data and other information respecting the variances to be reviewed (including data and other information concerning new scientific matters bearing on such variances), and (ii) advise of the opportunity to submit comments on the variances reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the Federal Register the results of his review together with findings responsive to comments submitted in connection with such review.

"(G)(i) If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting variances under subparagraph (A) or (B) or that in a substantial number of cases the State has failed to prescribe schedules in accordance with subparagraph (A), the Administrator shall notify the State of his findings. In determining if a State has abused its discretion in granting variances in a substantial number of instances, the Administrator shall consider the number of persons who are affected by the variances and if the requirements applicable to the granting of the variances were complied with. A notice under this clause shall—

"(1) identify each public water system with respect to which the finding was made,

"(II) specify the reasons for the finding, and

"(III) as appropriate, propose revocations of specific variances or propose revised schedules or other requirements for specific public water systems granted variances, or both.

"(ii) The Administrator shall provide reasonable notice and public hearing on the provisions of each notice given pursuant to clause (i) of this subparagraph. After a hearing on a notice pursuant to such clause, the Administrator shall (I) rescind the finding for which the notice was given and promptly notify the State of such rescission, or (II) promulgate (with such modifications as he deems appropriate) such variance revocations and revised schedules or other requirements proposed in such notice as he deems appropriate. Not later than 180 days after the date a notice is given pursuant to clause (i) of this subparagraph, the Administrator shall complete the hearing on the notice and take the action required by the preceding sentence.

Notice and
hearing.

"(iii) If a State is notified under clause (i) of this subparagraph of a finding of the Administrator made with respect to a variance granted a public water system within that State or to a schedule or other requirement for a variance and if, before a revocation of such variance or a revision of such schedule or other requirement promulgated by the Administrator takes effect, the State takes corrective action with respect to such variance or schedule or other requirement which the Administrator determines makes his finding inapplicable to such variance or schedule or other requirement, the Administrator shall rescind the application of his finding to that variance or schedule or other requirement. No variance revocation or revised schedule or other requirement may take effect before the expiration of 90 days following the date of the notice in which the revocation or revised schedule or other requirement was proposed.

"(2) If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to grant variances in such State as the State would have under paragraph (1) if it had primary enforcement responsibility.

"(3) The Administrator may grant a variance from any treatment technique requirement of a national primary drinking water regulation upon a showing by any person that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirement was prescribed. A variance under this paragraph shall be conditioned on the use of the alternative treatment technique which is the basis of the variance.

"(b) Any schedule or other requirement on which a variance granted under paragraph (1)(B) or (2) of subsection (a) is conditioned may be enforced under section 1414 as if such schedule or other requirement was part of a national primary drinking water regulation.

"(c) If an application for a variance under subsection (a) is made, the State receiving the application or the Administrator, as the case may be, shall act upon such application within a reasonable period (as determined under regulations prescribed by the Administrator) after the date of its submission.

Applications for
variances.

Regulations.

"(d) For purposes of this section, the term 'treatment technique requirement' means a requirement in a national primary drinking water regulation which specifies for a contaminant (in accordance with section 1401(1)(C)(ii)) each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412(b)(3).

"Treatment tech-
nique require-
ment."

"EXEMPTIONS

42 USC 300g-5.

"SEC. 1416. (a) A State which has primary enforcement responsibility may exempt any public water system within the State's jurisdiction from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable national primary drinking water regulation upon a finding that—

"(1) due to compelling factors (which may include economic factors), the public water system is unable to comply with such contaminant level or treatment technique requirement.

"(2) the public water system was in operation on the effective date of such contaminant level or treatment technique requirement, and

"(3) the granting of the exemption will not result in an unreasonable risk to health.

"(b) (1) If a State grants a public water system an exemption under subsection (a), the State shall prescribe, within one year of the date the exemption is granted, a schedule for—

"(A) compliance (including increments of progress) by the public water system with each containment level requirement and treatment technique requirement with respect to which the exemption was granted, and

"(B) implementation by the public water system of such control measures as the State may require for each containment, subject to such contaminant level requirement or treatment technique requirement, during the period ending on the date compliance with such requirement is required.

Notice and hearing.

Before a schedule prescribed by a State pursuant to this subsection may take effect, the State shall provide notice and opportunity for a public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the prescribing of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

"(2) (A) A schedule prescribed pursuant to this subsection for a public water system granted an exemption under subsection (a) shall require compliance by the system with each contaminant level and treatment technique requirement with respect to which the exemption was granted as expeditiously as practicable (as the State may reasonably determine) but (except as provided in subparagraph (B))—

"(i) in the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by the interim national primary drinking water regulations promulgated under section 1412(a), not later than January 1, 1981; and

"(ii) in the case of an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by revised national primary drinking water regulations, not later than seven years after the date such requirement takes effect.

"(B) Notwithstanding clauses (i) and (ii) of subparagraph (A) of this paragraph, the final date for compliance prescribed in a schedule prescribed pursuant to this subsection for an exemption granted for a public water system which (as determined by the State granting the exemption) has entered into an enforceable agreement to become a part of a regional public water system shall—

"(i) in the case of a schedule prescribed for an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by interim national primary drinking water regulations, be not later than January 1, 1983; and

"(ii) in the case of a schedule prescribed for an exemption granted with respect to a contaminant level or treatment technique requirement prescribed by revised national primary drinking water regulations, be not later than nine years after such requirement takes effect.

"(3) Each public water system's exemption granted by a State under subsection (a) shall be conditioned by the State upon compliance by the public water system with the schedule prescribed by the State pursuant to this subsection. The requirements of each schedule prescribed by a State pursuant to this subsection shall be enforceable by the State under its laws. Any requirement of a schedule on which an exemption granted under this section is conditioned may be enforced under section 1414 as if such requirement was part of a national primary drinking water regulation.

Compliance;
enforcement.

"(4) Each schedule prescribed by a State pursuant to this subsection shall be deemed approved by the Administrator unless the exemption for which it was prescribed is revoked by the Administrator under subsection (d) (2) or the schedule is revised by the Administrator under such subsection.

"(c) Each State which grants an exemption under subsection (a) shall promptly notify the Administrator of the granting of such exemption. Such notification shall contain the reasons for the exemption (including the basis for the finding required by subsection (a) (3) before the exemption may be granted) and document the need for the exemption.

Notice to Ad-
ministrator.

"(d) (1) Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the exemptions granted (and schedules prescribed pursuant thereto) by the States during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of exemptions and schedules as he deems necessary to carry out the purposes of this title, but each subsequent review shall be completed within each 3-year period following the completion of the first review under this subparagraph. Before conducting any review under this subparagraph, the Administrator shall publish notice of the proposed review in the Federal Register. Such notice shall (A) provide information respecting the location of data and other information respecting the exemptions to be reviewed (including data and other information concerning new scientific matters bearing on such exemptions), and (B) advise of the opportunity to submit comments on the exemptions reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the Federal Register the results of his review together with findings responsive to comments submitted in connection with such review.

Review of ex-
emptions and
schedules.

"(2) (A) If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting exemptions under subsection (a) or failed to prescribe schedules in accordance with subsection (b), the Administrator shall notify the State of his finding. In determining if a State has abused its discretion in granting exemptions in a substantial number of instances, the Administrator shall consider the number of persons who are affected by the exemptions and if the requirements applicable to the granting of the exemptions were complied with. A notice under this subparagraph shall—

Publication in
Federal Regis-
ter.

Publication in
Federal Regis-
ter.

Notice to
State.

"(i) identify each exempt public water system with respect to which the finding was made.

"(ii) specify the reasons for the finding, and

Notice and
hearing.

"(iii) as appropriate, propose revocations of specific exemptions or propose revised schedules for specific exempt public water systems, or both.

"(B) The Administrator shall provide reasonable notice and public hearing on the provisions of each notice given pursuant to subparagraph (A). After a hearing on a notice pursuant to subparagraph (A), the Administrator shall (i) rescind the finding for which the notice was given and promptly notify the State of such rescission, or (ii) promulgate (with such modifications as he deems appropriate) such exemption revocations and revised schedules proposed in such notice as he deems appropriate. Not later than 180 days after the date a notice is given pursuant to subparagraph (A), the Administrator shall complete the hearing on the notice and take the action required by the preceding sentence.

"(C) If a State is notified under subparagraph (A) of a finding of the Administrator made with respect to an exemption granted a public water system within that State or to a schedule prescribed pursuant to such an exemption and if before a revocation of such exemption or a revision of such schedule promulgated by the Administrator takes effect the State takes corrective action with respect to such exemption or schedule which the Administrator determines makes his finding inapplicable to such exemption or schedule, the Administrator shall rescind the application of his finding to that exemption or schedule. No exemption revocation or revised schedule may take effect before the expiration of 90 days following the date of the notice in which the revocation or revised schedule was proposed.

"Treatment
technique re-
quirement."

"(e) For purposes of this section, the term 'treatment technique requirement' means a requirement in a national primary drinking water regulation which specifies for a contaminant (in accordance with section 1401(1)(C)(ii)) each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412(b)(3).

"(f) If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to exempt public water systems in such State from maximum contaminant level requirements and treatment technique requirements under the same conditions and in the same manner as the State would be authorized to grant exemptions under this section if it had primary enforcement responsibility.

Applications
for exemptions.

"(g) If an application for an exemption under this section is made, the State receiving the application or the Administrator, as the case may be, shall act upon such application within a reasonable period (as determined under regulations prescribed by the Administrator) after the date of its submission.

"PART C—PROTECTION OF UNDERGROUND SOURCES OF DRINKING WATER

"REGULATIONS FOR STATE PROGRAMS

42 USC 300h.

"Sec. 1421. (a) (1) The Administrator shall publish proposed regulations for State underground injection control programs within 180 days after the date of enactment of this title. Within 180 days after publication of such proposed regulations, he shall promulgate such regulations with such modifications as he deems appropriate. Any regulation under this subsection may be amended from time to time.

WEDNESDAY, DECEMBER 24, 1975



PART IV:

**ENVIRONMENTAL
PROTECTION
AGENCY**

■

WATER PROGRAMS

**National Interim Primary Drinking
Water Regulations**

Title 40—Protection of Environment
CHAPTER I—ENVIRONMENTAL
PROTECTION AGENCY
SUBCHAPTER 9—WATER PROGRAMS
[FRL 464-7]

PART 141—NATIONAL INTERIM PRIMARY
DRINKING WATER REGULATIONS

On March 14, 1975, the Environmental Protection Agency (EPA) proposed National Interim Primary Drinking Water Regulations pursuant to sections 1412, 1414, 1415, and 1450 of the Public Health Service Act ("the Act"), as amended by the Safe Drinking Water Act ("SDWA," Pub. L. 93-523), 40 FR 11990. EPA held public hearings on the proposed regulations in Boston, Chicago, San Francisco, and Washington during the month of April. Several thousand pages of comments on the proposed regulations were received and evaluated. In addition, the Agency has received comments and information on the proposed regulations from the National Drinking Water Advisory Council, the Secretary of Health, Education, and Welfare, and from numerous others during meetings with representatives of State agencies, public interest groups and others.

The regulations deal only with the basic legal requirements. Descriptive material will be provided in a guidance manual for use by public water systems and the States.

The purpose of this preamble to the final regulations is to summarize the most significant changes made in the proposed regulations as a result of comments received and the further consideration of available information. A more detailed discussion of the comments and of changes in the proposed regulations is attached as Appendix A.

WATER SYSTEMS COVERED

The Safe Drinking Water Act applies to each "public water system," which is defined in Section 1401(4) of the Act as "a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals." Privately owned as well as publicly owned systems are covered. Service "to the public" is interpreted by EPA to include factories and private housing developments. (See generally, House Report, pp. 15-17.)

The definition of "public water system" proposed in the Interim Primary Drinking Water Regulations sought to explain the meaning of the statutory reference to "regular" service. It was proposed to interpret this term as including service for as much as three months during the year. Because the proposed definition would have excluded many large campgrounds, lodges, and other public accommodations which serve large numbers of tourists but which are open for slightly less than three months each year, the definition in the final version covers systems serving an average of at least twenty-five individuals at least 60 days out of the year. The use of a minimum number of days rather than

months also makes clear that a system may qualify as a public water system even if it is not open every day during a given month.

Once "public water system" has been defined, it is necessary to define the two major types of public water systems—those serving residents and those serving transients or intermittent users. The possible health effects of a contaminant in drinking water in many cases are quite different for a person drinking the water for a long period of time than for a person drinking the water only briefly or intermittently. Different regulatory considerations may in some cases apply to systems which serve residents as opposed to systems which serve transients or intermittent users. Accordingly, § 141.2(e) makes clear that all "public water systems" fall within either the category of "community water systems" or the category of "non-community water systems." To make clear which regulatory requirements apply to which type of system, the category covered is specifically indicated throughout the regulations.

The proposed regulations defined a "community water system" as "a public water system which serves a population of which 70 percent or greater are residents." Reliance in the proposed definition on the percentage of water system users who are residents would result in treating some fairly large resort communities with many year-round residents as non-community systems. Therefore, the definition of "community water system" has been changed to cover any system which serves at least 15 service connections used by year-round residents or serves at least 25 year-round residents.

SMALL COMMUNITY WATER SYSTEMS

Many community water systems in the country are quite small. Since it is the intention of the Act to provide basically the same level of health protection to residents of small communities as to residents of large cities, and since a number of advanced water treatment techniques are made feasible only by economies of scale, the cost of compliance with the requirements of the Act may pose a serious problem for many small communities. The regulations seek to recognize the financial problems of small communities by requiring more realistic monitoring for systems serving fewer than 1,000 persons. Variances and exemptions authorized by the Act can also assist in dealing with economic problems of small community systems in appropriate cases, at least temporarily. EPA will provide technical assistance on effective treatment techniques which can be used by small systems.

These methods of dealing with the financial problems of some small community systems may not be sufficient in specific instances to make compliance with all applicable regulatory requirements feasible. EPA is commencing a study of potential problems faced by small community systems in meeting applicable requirements under the Act and these regulations, and, if necessary, will make additional adjustments in the In-

terim Primary Drinking Water Regulations prior to their effective date.

Non-Community Systems

"Non-community systems" are basically those systems which serve transients. They include hotels, motels, restaurants, campgrounds, service stations, and other public accommodations which have their own water system and which have at least 15 service connections or serve water to a daily average of at least 25 persons. Some schools, factories, and churches are also included in this category. It is conservatively estimated that there are over 200,000 non-community water systems in the country. However, it should be recognized that while their number is large, they normally are not the principal source of water for the people they serve.

The regulations as proposed would have applied all maximum contaminant levels to non-community systems as well as to community systems. This approach failed to take into account the fact that the proposed maximum contaminant levels for organic chemicals and most inorganic chemicals were based on the potential health effects of long-term exposure. Those levels are not necessary to protect transients or intermittent users. Therefore, the final regulations provide that maximum contaminant levels for organic chemicals, and for inorganic chemicals other than nitrates, are not applicable to non-community systems. An exception was made for nitrates because they can have an adverse health effect on susceptible infants in a short period of time.

Even without monitoring for organic chemicals or most inorganic chemicals, in the initial stages of implementation of the drinking water regulations, monitoring results from tens of thousands of non-community systems could overwhelm laboratory capabilities and other resources. This could delay effective implementation of the regulations with respect to the community systems which provide the water which Americans drink every day. To avoid this result, non-community systems will be given two years after the effective date of the regulations to commence monitoring. In the meantime, non-community systems which already monitor their water are encouraged to continue to do so, and the States are encouraged to take appropriate measures to test or require monitoring for non-community systems that serve large numbers of people.

Of course, non-community systems which pose a threat to health should be dealt with as quickly as possible. The maximum contaminant levels applicable to non-community water systems therefore will take effect 18 months after promulgation, at the same time as levels applicable to community systems. Inspection and enforcement authority will apply to non-community systems at the same time as to community systems.

Sanitary Surveys

EPA encourages the States to conduct sanitary surveys on a systematic basis.

These on-site inspections of water systems are more effective in assuring safe water to the public than individual tests taken in the absence of sanitary surveys. The regulations provide that monitoring frequencies for coliform bacteria can be changed by the entity with primary enforcement responsibility for an individual non-community system, and in certain circumstances for an individual community system, based on the results of a sanitary survey.

MAXIMUM CONTAMINANT LEVELS

Numerous comments were received by EPA on the substances selected for the establishment of maximum contaminant levels and on the levels chosen. Congress anticipated that the initial Interim Primary Drinking Water Regulations would be based on the Public Health Service Standards of 1962, and this Congressional intent has been followed. Comments received on the various levels did not contain new data sufficient to require the establishment of levels different from those contained in the Public Health Service Standards.

WATER CONSUMPTION

The maximum contaminant levels are based, directly or indirectly, on an assumed consumption of two liters of water per day. The same assumption was used in the 1962 Standards. This assumption has been challenged because of instances, where much higher water consumption rates occur. EPA's justification for using the two-liter figure is that it already represents an above average water or water-based fluid intake. Moreover, while the factor of safety may be somewhat reduced when greater quantities of water are ingested, the maximum contaminant levels based on the two-liter figure provide substantial protection to virtually all consumers. If, as has been suggested, a water consumption rate of eight liters per day is used as the basis for maximum contaminant level, all of the proposed MCL's would have to be divided by four, greatly increasing the monitoring difficulties, and in some cases challenging the sensitivity of accepted analytical procedures. It could be expected, in such a case, that the maximum contaminant levels would be exceeded to a significant degree, and that specialized treatment techniques would be required to order that the contaminant levels would be reduced. The economic impact of a move in this direction would be enormous. It is not technically or economically feasible to base maximum contaminant levels on unusually high consumption rates.

SAFETY FACTORS

A question was raised about the fact that different safety factors are contained in various maximum contaminant levels. The levels are not intended to have a uniform safety factor, at least partly because the knowledge of and the nature of the health risks of the various contaminants vary widely. The levels set are the result of experience, evaluation of the available data, and professional

judgment. They have withstood the test of time and of professional review. They are being subjected to further review by the National Academy of Sciences in connection with development of data for the Revised Primary Drinking Water Regulations.

MCL'S BASED ON TEMPERATURE

A question was also raised as to whether ranges of maximum contaminant levels should be established on the basis of the climate in the area served by the public water system, as was done with fluoride. EPA believes that the use of a temperature scale for fluoride is more appropriate than for other chemicals because of the studies available on the fluoride-temperature relationship and because there is a small margin with fluoride between beneficial levels and levels that cause adverse health effects.

MCL'S DELETED

Three proposed maximum contaminant levels have been eliminated in the final regulations because they are not justified by the available data. One of these is carbon chloroform extract (CCE), which is discussed separately below. The others are the proposed levels for the standard bacterial plate count and cyanide. In the case of the plate count, it is believed that the coliform limits contained in the regulations, combined with the turbidity maximum contaminant level, adequately deal with bacterial contamination. However, EPA continues to believe that the standard plate count is a valid indicator of bacteriological quality of drinking water, and recommends that it be used in appropriate cases in conjunction with the coliform tests as an operational tool.

The proposed maximum contaminant level for cyanide was eliminated because the possibility of cyanide contamination can be effectively addressed only by the use of emergency action, such as under Section 1431 of the Act. EPA's 1989 Community Water Supply Study did not reveal a single instance in which cyanide was present in a water system at a level greater than one-thousandth of the level at which cyanide is toxic to humans.

Available data indicate that cyanide will be present in water systems at toxic levels only in the event of an accident, such as a spill from a barge collision. Maximum contaminant levels are not the appropriate vehicle for dealing with such rare, accidental contamination.

Heptachlor, heptachlor epoxide and chlordane have also been removed from the list of maximum contaminant levels at least temporarily in view of the pending cancellation and suspension proceedings under the Federal Insecticide, Fungicide and Rodenticide Act involving these pesticides. When the results of these proceedings are available, EPA will again consider whether maximum contaminant levels should be established for those three pesticides.

SODIUM AND SULFATES

A number of comments were received on the potential health effects of sodium

and sulfates. The National Drinking Water Advisory Council has recommended that consideration be given to the monitoring of these constituents, but has not recommended the adoption of maximum contaminant levels because available data do not support the adoption of any specific levels. EPA has requested the National Academy of Sciences to include sodium and sulfates among the contaminants to be studied by NAS, and to include information on the health effects of sodium and sulfates in the report to be made by NAS in December 1976.

Since a number of persons suffer from diseases which are influenced by dietary sodium intake and since there are others who wish to restrict their sodium intake, it is desirable that the sodium content of drinking water be known. Those affected can, by knowing the sodium concentration in their drinking water, make adjustments to their diets or, in extreme cases, seek alternative sources of water to be used for drinking and food preparation. It is recommended that the States institute programs for regular monitoring of the sodium content of drinking water served to the public, and for informing physicians and consumers of the sodium concentration in drinking water.

A relatively high concentration of sulfate in drinking water has little or no known laxative effect on regular users of the water, but transients using such water sometimes experience a laxative effect. It is recommended that the States institute monitoring programs for sulfates, and that transients be notified if the sulfate content of the water is high. Such notification should include an assessment of the possible physiological effects of consumption of the water.

PCB'S AND ASBESTOS

An interagency comment expressed concern for asbestos and PCB's in the environment and noted the need for at least a monitoring requirement, if not for MCL's, for these contaminants. EPA is also concerned, but for the moment lacks sufficient evidence regarding analytical methods, health effects, or occurrence in the environment to establish MCL's. The Agency is conducting research and cooperating in research projects to develop criteria for establishing needed limits as quickly as possible. A monitoring study on a number of organic chemical contaminants, including PCB's, for which MCL's are not being established at this time, will be contained in an organic chemical monitoring regulation that is being promulgated with these regulations. Regarding asbestos, HEW and EPA are sponsoring a number of studies this year at an approximate cost of \$16 million to establish health effects, analytical methods and occurrence.

POINT OF MEASUREMENT

Other comments on maximum contaminant levels focused on the proposed requirement that such levels be tested at the consumer's tap. Concern was expressed over the inability of the public water system to control potential sources

of contaminants which are under the control of the consumer.

The promulgated definition of "maximum contaminant level," § 141.2(d), retains the requirement that the maximum contaminant level be measured at the tap except in the case of turbidity, which should be measured at the point of entry to the distribution system. However, the definition has been expanded to make clear that contaminants added to the water by circumstances under the control of the consumer are not the responsibility of the supplier of water, unless the contaminants result from corrosion of piping and plumbing resulting from the quality of the water supplied. It should be noted, however, that this requirement should not be interpreted as to discourage local, aggressive cross connection control measures.

COLIFORM BACTERIA MCL's

The promulgated MCL's for coliform bacteria are basically the 1962 Public Health Service Standards, with minor refinements and clarifications. However, further changes may be desirable. For example, the MCL's for the membrane filter analytical method do not resolve the question of how many coliform bacteria are assumed to be present in a single highly contaminated sample. Some laboratories assume an upper limit of 50, while others seek to continue to count individual bacteria to a level of 100 or even higher in a single sample. The upper limit assumed will affect the monthly average which is calculated to determine compliance with the MCL's.

Another question relating to the coliform bacteria MCL's is the matter of possible spurious positive samples. As the regulations are written, all routine samples taken to determine compliance with the MCL's must be counted, regardless of the results of analysis of any check samples that may be taken. The reason for this is that bacterial contamination is often intermittent or transient, and as a result negative check samples taken a day or more after a positive sample cannot demonstrate that the positive result was in error. It may be possible, however, to prescribe a means of dealing with spurious positive results without compromising the integrity of the MCL's.

A third question concerning the MCL's for coliform bacteria is the relationship of monthly averages of coliform bacteria levels to monthly percentages of positive samples. For example, the monthly average MCL for the membrane filter method is violated if the monthly average exceeds one coliform bacterium per sample. However, for purposes of determining whether the monthly-percentage-of-positive-samples MCL is violated, a sample is counted as positive only if it contains more than four coliform bacteria. Thus, it is possible, particularly when a relatively small number of samples is taken, for a system to fail the monthly average MCL even when no single sample taken during the month is out of compliance with the limit.

These and other questions concerning the coliform bacteria MCL's will be re-

viewed further by EPA. If review indicates that changes in the MCL's are desirable, those changes will be made as soon as possible but within 6 months, in time to take effect at the same time as the initial Interim Primary Drinking Water Regulations.

ORGANIC CHEMICALS

The proposed maximum contaminant levels for organic pesticides, other than the three which are the subject of cancellation and suspension proceedings, have been retained. It is anticipated that additional organic pesticides will be added to the regulations if surveys of pesticides in drinking water being conducted by EPA indicate that this is needed.

The proposed regulations also contained a maximum contaminant level for organic chemicals obtained by the carbon chloroform extract (CCE) method. It was anticipated by Congress that organic chemicals would be dealt with primarily in the Revised Primary Drinking Water Regulations because of the paucity of accurate data on the health effects of various organic chemicals, the large number of such chemicals, uncertainties over appropriate treatment techniques, and the need for additional information on the incidence of specific organic chemicals in drinking water supplies. EPA thought that the CCE standard might provide an appropriate means of dealing with organic chemicals as a class pending action on the Revised Primary Regulations.

The CCE standard was originally developed as a test for undesirable tastes and odors in drinking water. As concern developed over the health effects of organic chemicals, the possibility of using CCE as a health standard rather than an esthetic standard was considered.

As pointed out by numerous comments, CCE has many failings as an indicator of health effects of organic chemicals. To begin with, the test obtains information on only a fraction of the total amount of organic chemicals in the water sampled. Furthermore, there is serious question as to the reliability of CCE in identifying those organic chemicals which are most suspected of adverse health effects. In addition, there are no existing data on which a specific level for CCE can be established on a rational basis. To establish a maximum contaminant level under these circumstances would almost certainly do more harm than good. It could give a false sense of security to persons served by systems which are within the established level and a false sense of alarm to persons served by systems which exceed the level. It also would divert resources from efforts to find more effective ways of dealing with the organic chemicals problem.

EPA believes that the intelligent approach to the organic chemicals question is to move ahead as rapidly as possible along two fronts. First, EPA is adopting simultaneously with these regulations a Subpart E of Part 141, containing requirements for organic chemi-

cal monitoring pursuant to Sections 1445 and 1450 of the Act.

The regulations require that designated public water systems collect samples of raw and treated water for submission to EPA for organics analysis. EPA will analyze the samples for a number of broad organic parameters, including carbon chloroform extract (CCE), volatile and non-volatile total organic carbon (VTOC and NVTOC), total organic chlorine (TOCl), ultraviolet absorbancy, and fluorescence. In addition, monitoring will be required for probably 21 specific organic compounds. Selection of the specific compounds has been based on the occurrence or likelihood of occurrence in treated water, toxicity data and availability of practical analytical methods. Laboratory analyses will be used to evaluate the extent and nature of organic chemical contamination of drinking water, to evaluate the validity of the general organic parameters as surrogates for measures of harmful organic chemicals, and to determine whether there is an adequate basis for establishing maximum contaminant levels for specific organics or groups of organics.

Second, EPA is embarking on an intensive research program to find answers to the following four questions:

1. What are the effects of commonly occurring organic compounds on human health?
2. What analytical procedures should be used to monitor finished drinking water to assure that any Primary Drinking Water Regulations dealing with organics are met?
3. Because some of these organic compounds are formed during water treatment, what changes in treatment practices are required to minimize the formation of these compounds in treated water?
4. What treatment technology must be applied to reduce contaminant levels to concentrations that may be specified in the Primary Drinking Water Regulations?

This research will involve health-effects and epidemiological studies, investigations of analytical methodology, and pilot plant and field studies of organic removal unit processes. Some phases of the research are to be completed by the end of this year, while much of the remainder are to be completed within the next calendar year.

As soon as sufficient information is derived from the monitoring program and related research, the Interim Primary Drinking Water Regulations will be amended so that the organic chemicals problem can be dealt with without delay. The monitoring process will be completed within 1 year.

During the interim period, while satisfactory MCL's for organic contamination in drinking water are being developed, EPA will act in specific cases where appropriate to deal with organic contamination. If the EPA monitoring program reveals serious specific cases of contamination, EPA will work with State and local authorities to identify the source and nature of the problem and to

take remedial action. EPA will also aid the States in identifying additional community water supplies that require analysis.

PUBLIC NOTICE

The public notice requirements proposed in § 141.32 did not distinguish between community and non-community public water systems. They would have required that public notice of non-compliance with applicable regulations be made by newspaper, in water bills, and by other media for all public water systems. These requirements are inappropriate and ineffective in the case of most non-community water systems. Those systems principally serve transients who do not receive water bills from the system and who probably are not exposed significantly to the local media. A more effective approach would be to require notice that can inform the transient before he drinks the system's water, and thereby both warn the transient and provide an incentive to the supplier of water to remedy the violation. Accordingly, Section 141.32 as adopted provides that in the case of non-community systems, the entity with primary enforcement responsibility shall require that notice be given in a form and manner that will insure that the public using the public water system is adequately informed.

The proposed public notice requirements also failed to distinguish between different types of violations of the Interim Primary Drinking Water Regulations. Since the urgency and importance of a notice varies according to the nature of the violation involved, § 141.32 as promulgated seeks to match the type of notice required with the type of violation involved. Written notice accompanying a water bill or other direct notice by mail is required for all violations of the regulations, including violations of monitoring requirements, and for the grant of a variance or exemption. In addition, notice by newspaper and notification to radio and television stations is required whenever a maximum contaminant level is exceeded, or when the entity with primary enforcement responsibility requires such broader notice.

QUALITY CONTROL AND TESTING PROCEDURES

Section 1401(1) of the Act defines "primary drinking water regulation" to include "quality control and testing procedures." The promulgated regulations include testing requirements for each maximum contaminant level, including check samples and special samples in appropriate cases. The regulations also specify the procedures to be followed in analyzing samples for each of the maximum contaminant levels. These procedures will be updated from time to time as advances are made in analytical methods. For example, references to "Standard Methods for the Examination of Water and Wastewater" are to the current, 13th, edition, but these references will be changed to cite the 14th edition when it is available in the near future.

A key element of quality control for public water systems is accurate laboratory analysis. Section 141.28 of the regulations provides that analyses conducted for the purpose of determining compliance with maximum contaminant levels must be conducted by a laboratory approved by the entity with primary enforcement responsibility. EPA will develop as soon as possible, in cooperation with the States and other interested parties, criteria and procedures for laboratory certification. A State with primary enforcement responsibility will have a laboratory certified by EPA pursuant to the prescribed criteria and procedures, and in turn will certify laboratories within the State.

Record-keeping requirements and reports to the State also will assist in quality control efforts.

RECORD-KEEPING

Adequate record-keeping is necessary for the proper operation and administration of a public water system. It is also important for providing information to the public, providing appropriate data for inspection and enforcement activities and providing information on which future regulations can be based. Accordingly, a new § 141.33 has been added to the regulations to require that each public water system maintain records of sample analyses and of actions to correct violations of the Primary Drinking Water Regulations.

ECONOMIC AND COST ANALYSIS

A comprehensive economics study has been made of the Interim Primary Drinking Water Regulations. This study estimates the costs of the regulations, evaluates the potential economic impact, and considers possible material and labor shortages. The results of this analysis are summarized here.

Total investment costs to community water systems to achieve compliance with these regulations are estimated to be between \$1,050 and \$1,765 million. It is estimated that non-community systems will invest an additional \$24 million. The range of the estimate is due to uncertainty as to the design flow that will be used in installing treatment facilities. Systems not in compliance will have to consider sizing their new components to reflect average daily flow conditions, or maximum daily flow conditions in cases where system storage is not adequate.

This investment will be spread over several years. Investor-owned systems will bear about one-fourth of these costs, and publicly-owned systems the remainder. It is not anticipated that systems will have difficulty financing these capital requirements.

In annual terms, national costs are expected to be within the following ranges:

In millions	
Capital costs.....	\$146-247
Operations and maintenance.....	365-363
Monitoring (routine only).....	17- 35
Total	\$428-545

Although these aggregate figures are large, most water consumers will not be

significantly affected. For those users in systems serving 10,000 persons or more, the average annual treatment cost per capita may increase from less than \$1.00 for systems requiring disinfection and lead control, to between \$15 to \$35 for control of turbidity and heavy metal removal. For systems serving less than 100 persons, the average annual per capita costs of disinfection, lead control and fluoride/arsenic removal are estimated to be between \$2.10 and \$11.80. However, if turbidity control or heavy metal removal were required in a system of this size then costs are expected to range from \$52 to \$237 per year per capita. EPA is aware of the serious potential economic impact on users in these small systems. However, the legislative history specifies that the regulations should be based on costs that can be reasonably afforded by large metropolitan or regional systems. Further economic evaluation of these systems is being conducted, and realistic options for these small systems are being reviewed. Options that will be under consideration include less costly treatment technologies; formation of regional systems; and use of alternative water sources. Industrial and commercial users, whether providing their own water or using public systems, are not expected to be significantly affected by these regulations.

Possible constraints to the implementation of the interim primary regulations were examined. Although there will be an increase in demand for chemicals, manpower, laboratories, and construction of treatment facilities, it is not anticipated that any of these factors will be a serious obstacle to implementation of these regulations over a reasonable time frame.

For the reasons given above, Chapter 40 of the Code of Federal Regulations is hereby amended by the addition of the following new Part 141. These regulations will take effect 18 months after promulgation.

(It is hereby certified that the economic and inflationary impacts of these regulations have been carefully evaluated in accordance with Executive Order 11821.)

Dated: December 10, 1975.

RUSSELL E. TRAIN,
Administrator.

Subpart A—General

Sec.	
141.1	Applicability.
141.2	Definitions.
141.3	Coverage.
141.4	Variance and exemptions.
141.5	Testing requirements.
141.6	Effective date.

Subpart B—Maximum Contaminant Levels

141.11	Maximum contaminant levels for inorganic chemicals.
141.12	Maximum contaminant levels for organic chemicals.
141.13	Maximum contaminant levels for turbidity.
141.14	Maximum microbiological contaminant levels.

Subpart C—Monitoring and Analytical Requirements

141.21	Microbiological contaminant sampling and analytical requirements.
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- Sec.
141.23 Turbidity sampling and analytical requirements.
141.23 Inorganic chemical sampling and analytical requirements.
141.24 Organic chemical sampling and analytical requirements.
141.27 Alternative analytical techniques.
141.28 Approved laboratories.
141.29 Monitoring of consecutive public water systems.

Subpart D—Reporting, Public Notification, and Record-keeping

- 141.31 Reporting requirements.
141.32 Public notification of variances, exemptions, and non-compliance with regulations.
141.33 Record maintenance.

AUTHORITY: Secs. 1412, 1414, 1445, and 1450 of the Public Health Service Act, 68 Stat. 1860 (42 U.S.C. 300g-1, 300g-3, 300g-4, and 300g-5).

Subpart A—General

§ 141.1 Applicability.

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93-523); and related regulations applicable to public water systems.

§ 141.2 Definitions.

As used in this part, the term:

- (a) "Act" means the Public Health Service Act, as amended by the Safe Drinking Water Act, Pub. L. 93-523.
(b) "Contaminant" means any physical, chemical, biological, or radiological substance or matter in water.
(c) "Maximum contaminant level" means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a public water system, except in the case of turbidity where the maximum permissible level is measured at the point of entry to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.
(d) "Person" means an individual, corporation, company, association, partnership, State, municipality, or Federal agency.
(e) "Public water system" means a system for the provision to the public of piped water for human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water system is either a "community water system" or a "non-community water system."
(f) "Community water system" means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

(h) "Non-community water system" means a public water system that is not a community water system.

(i) "Sanitary survey" means an on-site review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

(g) "Standard sample" means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

(h) "State" means the agency of the State government which has jurisdiction over public water systems. During any period when a State does not have primary enforcement responsibility pursuant to Section 1413 of the Act, the term "State" means the Regional Administrator, U.S. Environmental Protection Agency.

(i) "Supplier of water" means any person who owns or operates a public water system.

§ 141.3 Coverage.

This part shall apply to each public water system, unless the public water system meets all of the following conditions:

- (a) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);
(b) Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply;
(c) Does not sell water to any person; and
(d) Is not a carrier which conveys passengers in interstate commerce.

§ 141.4 Variances and exemptions.

Variances or exemptions from certain provisions of these regulations may be granted pursuant to Sections 1415 and 1416 of the Act by the entity with primary enforcement responsibility. Provisions under Part 142, *National Interim Primary Drinking Water Regulations Implementation—subpart E (Variances)* and subpart F (Exemptions)—apply where EPA has primary enforcement responsibility.

§ 141.5 Siting requirements.

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the State and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

- (a) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or
(b) Except for intake structures, is within the floodplain of a 100-year flood or is lower than any recorded high tide where appropriate records exist.

The U.S. Environmental Protection Agency will not seek to override land use decisions affecting public water systems siting which are made at the State or local government levels.

§ 141.6 Effective date.

The regulations set forth in this part shall take effect 18 months after the date of promulgation.

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The maximum contaminant level for nitrate is applicable to both community water systems and non-community water systems. The levels for the other inorganic chemicals apply only to community water systems. Compliance with maximum contaminant levels for inorganic chemicals is calculated pursuant to § 141.23.

(b) The following are the maximum contaminant levels for inorganic chemicals other than fluoride:

Contaminant	Level, milligrams per liter
Arsenic	0.05
Barium	1
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.005
Nitrate (as N)	10
Selenium	0.01
Silver	0.05

(c) When the annual average of the maximum daily air temperatures for the location in which the community water system is situated is the following, the maximum contaminant levels for fluoride are:

Temperature Degrees Fahrenheit	Degrees Celsius	Level, milligrams per liter
32.7 and below	12.6 and below	2.4
32.8 to 33.3	12.1 to 14.8	2.1
33.4 to 38.3	11.7 to 17.8	2.0
38.4 to 70.8	17.7 to 21.4	1.8
70.9 to 75.2	21.5 to 22.2	1.6
75.3 to 85.3	23.3 to 22.3	1.4

§ 141.12 Maximum contaminant levels for organic chemicals.

The following are the maximum contaminant levels for organic chemicals. They apply only to community water systems. Compliance with maximum contaminant levels for organic chemicals is calculated pursuant to § 141.24.

	Level, milligrams per liter
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10, 10-hexachloro-6,7-epoxy-1,4, 4a,5,6,7,8a-octa-hydro-1,4-endo, endo-5,8 - di-methano naphthalene).	0.0003
Lindane (1,2,3,4,5,6-hexachloro-cyclohexane, gamma isomer).	0.004
Methoxychlor (1,1,1-Trichloro-2, 2 - bis [p-methoxyphenyl] ethane).	0.1
Toxaphene (C ₁₂ H ₈ Cl ₆ -Technical chlorinated camphene, 67-69 percent chlorine).	0.005

RULES AND REGULATIONS

59571

- (b) Chlorophenoxy:
2,4-D, (2,4-Dichlorophenoxyacetic acid). 0.1
2,4,5-TP Slaves (2,4,5-Trichlorophenoxypropionic acid). 0.01

§ 141.13 Maximum contaminant levels for turbidity.

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

(a) One turbidity unit (TU), as determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

- (1) Interfere with disinfection;
- (2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or
- (3) Interfere with microbiological determinations.

(b) Five turbidity units based on an average for two consecutive days pursuant to § 141.22.

§ 141.14 Maximum microbiological contaminant levels.

The maximum contaminant levels for coliform bacteria, applicable to community water systems and non-community water systems, are as follows:

(a) When the membrane filter technique pursuant to § 141.21(a) is used, the number of coliform bacteria shall not exceed any of the following:

(1) One per 100 milliliters as the arithmetic mean of all samples examined per month pursuant to § 141.21 (b) or (c);

(2) Four per 100 milliliters in more than one sample when less than 20 are examined per month; or

(3) Four per 100 milliliters in more than five percent of the samples when 20 or more are examined per month.

(b) (1) When the fermentation tube method and 10 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) more than 10 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) three or more portions in more than one sample when less than 20 samples are examined per month; or

(iii) three or more portions in more than five percent of the samples when 20 or more samples are examined per month.

(2) When the fermentation tube method and 100 milliliter standard portions pursuant to § 141.21(a) are used, coliform bacteria shall not be present in any of the following:

(i) more than 60 percent of the portions in any month pursuant to § 141.21 (b) or (c);

(ii) five portions in more than one sample when less than five samples are examined per month; or

(iii) five portions in more than 20 percent of the samples when five or more samples are examined per month.

(c) For community or non-community systems that are required to sample at a rate of less than 4 per month, compliance with paragraphs (a), (b)(1), or (b)(2) of this section shall be based upon sampling during a 3 month period, except that, at the discretion of the State, compliance may be based upon sampling during a one-month period.

Subpart C—Monitoring and Analytical Requirements

§ 141.21 Microbiological contaminant sampling and analytical requirements.

(a) Suppliers of water for community water systems and non-community water systems shall analyze for coliform bacteria for the purpose of determining compliance with § 141.14. Analyses shall be conducted in accordance with the analytical recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 662-688, except that a standard sample size shall be employed. The standard sample used in the membrane filter procedure shall be 100 milliliters. The standard sample used in the 5 tube most probable number (MPN) procedure (fermentation tube method) shall be 5 times the standard portion. The standard portion is either 10 milliliters or 100 milliliters as described in § 141.14 (b) and (c). The samples shall be taken at points which are representative of the conditions within the distribution system.

(b) The supplier of water for a community water system shall take coliform density samples at regular time intervals, and in number proportionate to the population served by the system. In no event shall the frequency be less than as set forth below:

Population served:	Minimum number of samples per month
25 to 1,000.....	1
1,001 to 2,500.....	2
2,501 to 5,000.....	3
5,001 to 10,000.....	4
10,001 to 15,000.....	5
15,001 to 20,000.....	6
20,001 to 25,000.....	7
25,001 to 30,000.....	8
30,001 to 35,000.....	9
35,001 to 40,000.....	10
40,001 to 45,000.....	11
45,001 to 50,000.....	12
50,001 to 55,000.....	13
55,001 to 60,000.....	14
60,001 to 65,000.....	15
65,001 to 70,000.....	16
70,001 to 75,000.....	17
75,001 to 80,000.....	18
80,001 to 85,000.....	19
85,001 to 90,000.....	20
90,001 to 95,000.....	21
95,001 to 100,000.....	22
100,001 to 105,000.....	23
105,001 to 110,000.....	24
110,001 to 115,000.....	25
115,001 to 120,000.....	26
120,001 to 125,000.....	27
125,001 to 130,000.....	28
130,001 to 135,000.....	29
135,001 to 140,000.....	30

20,001 to 25,000.....	35
25,001 to 30,000.....	40
30,001 to 35,000.....	45
35,001 to 40,000.....	50
40,001 to 45,000.....	55
45,001 to 50,000.....	60
50,001 to 55,000.....	65
55,001 to 60,000.....	70
60,001 to 65,000.....	75
65,001 to 70,000.....	80
70,001 to 75,000.....	85
75,001 to 80,000.....	90
80,001 to 85,000.....	95
85,001 to 90,000.....	100
90,001 to 95,000.....	105
95,001 to 100,000.....	110
100,001 to 105,000.....	115
105,001 to 110,000.....	120
110,001 to 115,000.....	125
115,001 to 120,000.....	130
120,001 to 125,000.....	135
125,001 to 130,000.....	140
130,001 to 135,000.....	145
135,001 to 140,000.....	150
140,001 to 145,000.....	155
145,001 to 150,000.....	160
150,001 to 155,000.....	165
155,001 to 160,000.....	170
160,001 to 165,000.....	175
165,001 to 170,000.....	180
170,001 to 175,000.....	185
175,001 to 180,000.....	190
180,001 to 185,000.....	195
185,001 to 190,000.....	200
190,001 to 195,000.....	205
195,001 to 200,000.....	210
200,001 to 205,000.....	215
205,001 to 210,000.....	220
210,001 to 215,000.....	225
215,001 to 220,000.....	230
220,001 to 225,000.....	235
225,001 to 230,000.....	240
230,001 to 235,000.....	245
235,001 to 240,000.....	250
240,001 to 245,000.....	255
245,001 to 250,000.....	260
250,001 to 255,000.....	265
255,001 to 260,000.....	270
260,001 to 265,000.....	275
265,001 to 270,000.....	280
270,001 to 275,000.....	285
275,001 to 280,000.....	290
280,001 to 285,000.....	295
285,001 to 290,000.....	300
290,001 to 295,000.....	305
295,001 to 300,000.....	310
300,001 to 305,000.....	315
305,001 to 310,000.....	320
310,001 to 315,000.....	325
315,001 to 320,000.....	330
320,001 to 325,000.....	335
325,001 to 330,000.....	340
330,001 to 335,000.....	345
335,001 to 340,000.....	350
340,001 to 345,000.....	355
345,001 to 350,000.....	360
350,001 to 355,000.....	365
355,001 to 360,000.....	370
360,001 to 365,000.....	375
365,001 to 370,000.....	380
370,001 to 375,000.....	385
375,001 to 380,000.....	390
380,001 to 385,000.....	395
385,001 to 390,000.....	400
390,001 to 395,000.....	405
395,001 to 400,000.....	410
400,001 to 405,000.....	415
405,001 to 410,000.....	420
410,001 to 415,000.....	425
415,001 to 420,000.....	430
420,001 to 425,000.....	435
425,001 to 430,000.....	440
430,001 to 435,000.....	445
435,001 to 440,000.....	450
440,001 to 445,000.....	455
445,001 to 450,000.....	460
450,001 to 455,000.....	465
455,001 to 460,000.....	470
460,001 to 465,000.....	475
465,001 to 470,000.....	480
470,001 to 475,000.....	485
475,001 to 480,000.....	490
480,001 to 485,000.....	495
485,001 to 490,000.....	500

Based on a history of no coliform bacterial contamination and on a sanitary survey by the State showing the water system to be supplied solely by a protected ground water source and free of sanitary defects, a community water system serving 25 to 1,000 persons, with written permission from the State, may reduce this sampling frequency except that in no case shall it be reduced to less than one per quarter.

(c) The supplier of water for a non-community water system shall sample for coliform bacteria in each calendar quarter during which the system provides water to the public. Such sampling shall begin within two years after the effective date of this part. If the State, on the basis of a sanitary survey, determines that some other frequency is more appropriate, that frequency shall be the frequency required under these regulations. Such frequency shall be confirmed or changed on the basis of subsequent surveys.

(d) (1) When the coliform bacteria in a single sample exceed four per 100 milliliters (§ 141.14(a)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency estab-

lished by the State, until the results obtained from at least two consecutive check samples show less than one coliform bacterium per 100 milliliters.

(2) When coliform bacteria occur in three or more 10 ml portions of a single sample (§ 141.14(b)(1)), at least two consecutive daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(3) When coliform bacteria occur in all five of the 100 ml portions of a single sample (§ 141.14(b)(2)), at least two daily check samples shall be collected and examined from the same sampling point. Additional check samples shall be collected daily, or at a frequency established by the State, until the results obtained from at least two consecutive check samples show no positive tubes.

(4) The location at which the check samples were taken pursuant to paragraphs (d)(1), (2), or (3) of this section shall not be eliminated from future sampling without approval of the State. The results from all coliform bacterial analyses performed pursuant to this subpart, except those obtained from check samples and special purpose samples, shall be used to determine compliance with the maximum contaminant level for coliform bacteria as established in § 141.14. Check samples shall not be included in calculating the total number of samples taken each month to determine compliance with § 141.31 (b) or (c).

(e) When the presence of coliform bacteria in water taken from a particular sampling point has been confirmed by any check samples examined as directed in paragraphs (d)(1), (2), or (3) of this section, the supplier of water shall report to the State within 48 hours.

(f) When a maximum contaminant level set forth in paragraphs (a), (b) or (c) of § 141.14 is exceeded, the supplier of water shall report to the State and notify the public as prescribed in § 141.31 and § 141.32.

(g) Special purpose samples, such as those taken to determine whether disinfection practices following pipe placement, replacement, or repair have been sufficient, shall not be used to determine compliance with § 141.14 or § 141.31 (b) or (c).

(h) A supplier of water of a community water system or a non-community water system may, with the approval of the State and based upon a sanitary survey, substitute the use of chlorine residual monitoring for not more than 75 percent of the samples required to be taken by paragraph (b) of this section. Provided, That the supplier of water takes chlorine residual samples at points which are representative of the conditions within the distribution system at the frequency of at least four for each substituted microbiological sample. There shall be at least daily determinations of chlorine residual. When the supplier of water exercises the option provided in this paragraph (h) of this section, he shall maintain no less than

0.2 mg/l free chlorine throughout the public water distribution system. When a particular sampling point has been shown to have a free chlorine residual less than 0.2 mg/l, the water at that location shall be retested as soon as practicable and in any event within one hour. If the original analysis is confirmed, this fact shall be reported to the State within 48 hours. Also, if the analysis is confirmed, a sample for coliform bacterial analysis must be collected from that sampling point as soon as practicable and preferably within one hour, and the results of such analysis reported to the State within 48 hours after the results are known to the supplier of water. Analyses for residual chlorine shall be made in accordance with "Standard Methods for the Examination of Water and Wastewater," 19th Ed., pp. 129-132. Compliance with the maximum contaminant levels for coliform bacteria shall be determined on the monthly mean or quarterly mean basis specified in § 141.14, including those samples taken as a result of failure to maintain the required chlorine residual level. The State may withdraw its approval of the use of chlorine residual substitution at any time.

§ 141.22 Turbidity sampling and analytical requirements.

(a) Samples shall be taken by suppliers of water for both community water systems and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purpose of making turbidity measurements to determine compliance with § 141.13. The measurement shall be made by the Nephelometric Method in accordance with the recommendations set forth in "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 13th Edition, pp. 350-353, or "Methods for Chemical Analysis of Water and Wastes," pp. 296-298, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(b) If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the State within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the State and notify the public as directed in § 141.31 and § 141.32.

(c) Sampling for non-community water systems shall begin within two years after the effective date of this part.

(d) The requirements of this § 141.22 shall apply only to public water systems which use water obtained in whole or in part from surface sources.

§ 141.23 Inorganic chemical sampling and analytical requirements.

(a) Analyses for the purpose of determining compliance with § 141.11 are required as follows:

(1) Analyses for all community water systems utilizing surface water sources shall be completed within one year following the effective date of this part. These analyses shall be repeated at yearly intervals.

(2) Analyses for all community water systems utilizing only ground water sources shall be completed within two years following the effective date of this part. These analyses shall be repeated at three-year intervals.

(3) For non-community water systems, whether supplied by surface or ground water sources, analyses for nitrate shall be completed within two years following the effective date of this part. These analyses shall be repeated at intervals determined by the State.

(b) If the result of an analysis made pursuant to paragraph (a) indicates that the level of any contaminant listed in § 141.11 exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) The provisions of paragraphs (b) and (c) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of the mean of two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the State pursuant to § 141.31 and shall notify the public pursuant to § 141.32.

(e) For the initial analyses required by paragraph (a)(1), (2) or (3) of this section, data for surface waters acquired within one year prior to the effective date and data for ground waters acquired within 3 years prior to the effective date of this part may be substituted at the discretion of the State.

(f) Analyses conducted to determine compliance with § 141.11 shall be made in accordance with the following methods:

(1) Arsenic—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 95-96, Environ-

mental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(2) Barium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 97-98, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(3) Cadmium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 101-103, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(4) Chromium—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 105-106, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(5) Lead—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," pp. 112-113, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(6) Mercury—Flameless Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," pp. 118-126, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(7) Nitrate—Brucine Colorimetric Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 481-484, or Cadmium Reduction Method, "Methods for Chemical Analysis of Water and Wastes," pp. 201-205, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(8) Selenium—Atomic Absorption Method, "Methods for Chemical Analysis of Water and Wastes," p. 145, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(9) Silver—Atomic Absorption Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 210-215, or "Methods for Chemical Analysis of Water and Wastes," p. 146, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

(10) Fluoride—Electrode Method, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 172-174, or "Methods for Chemical Analysis of Water and Wastes," pp. 65-67, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974, or Colorimetric Method with Preliminary Distillation, "Standard Methods for the Examination of Water and Wastewater," 13th Edition, pp. 171-172 and 174-176, or "Methods for Chemical Analysis of Water and Wastes," pp. 59-60, Environmental Protection Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

Agency, Office of Technology Transfer, Washington, D.C. 20460, 1974.

§ 141.24 Organic chemical sampling and analytical requirements.

(a) An analysis of substances for the purpose of determining compliance with § 141.12 shall be made as follows:

(1) For all community water systems utilizing surface water sources, analyses shall be completed within one year following the effective date of this part. Samples analyzed shall be collected during the period of the year designated by the State as the period when contamination by pesticides is most likely to occur. These analyses shall be repeated at intervals specified by the State but in no event less frequently than at three year intervals.

(2) For community water systems utilizing only ground water sources, analyses shall be completed by those systems specified by the State.

(b) If the result of an analysis made pursuant to paragraph (a) of this section indicates that the level of any contaminant listed in § 141.12 exceeds the maximum contaminant level, the supplier of water shall report to the State within 7 days and initiate three additional analyses within one month.

(c) When the average of four analyses made pursuant to paragraph (b) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall report to the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(d) For the initial analysis required by paragraph (a) (1) and (2) of this section, data for surface water acquired within one year prior to the effective date of this part and data for ground water acquired within three years prior to the effective date of this part may be substituted at the discretion of the State.

(e) Analyses made to determine compliance with § 141.12(a) shall be made in accordance with "Method for Organochlorine Pesticides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

(f) Analyses made to determine compliance with § 141.12(b) shall be conducted in accordance with "Methods for Chlorinated Phenoxy Acid Herbicides in Industrial Effluents," MDQARL, Environmental Protection Agency, Cincinnati, Ohio, November 28, 1973.

§ 141.27 Alternative analytical techniques.

With the written permission of the State, concurred in by the Administrator of the U.S. Environmental Protection Agency, an alternative analytical

technique may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by this part.

§ 141.28 Approved laboratories.

For the purpose of determining compliance with § 141.21 through § 141.27, samples may be considered only if they have been analyzed by a laboratory approved by the State except that measurements for turbidity and free chlorine residual may be performed by any person acceptable to the State.

§ 141.29 Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the State may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the State and concurred in by the Administrator of the U.S. Environmental Protection Agency.

Subpart D—Reporting, Public Notification and Record Keeping

§ 141.31 Reporting requirements.

(a) Except where a shorter reporting period is specified in this part, the supplier of water shall report to the State within 40 days following a test, measurement or analysis required to be made by this part, the results of that test, measurement or analysis.

(b) The supplier of water shall report to the State within 48 hours the failure to comply with any primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

(c) The supplier of water is not required to report analytical results to the State in cases where a State laboratory performs the analysis and reports the results to the State office which would normally receive such notification from the supplier.

§ 141.32 Public notification.

(a) If a community water system fails to comply with an applicable maximum contaminant level established in Subpart B, fails to comply with an applicable testing procedure established in Subpart C of this part, is granted a variance or an exemption from an applicable maximum contaminant level, fails to comply with the requirements of any schedule prescribed pursuant to a variance or exemption, or fails to perform any monitoring required pursuant to Section 1445 (a) of the Act, the supplier of water shall notify persons served by the system of the failure or grant by inclusion of a notice in the first set of water bills of the system issued after the failure or grant

and in any event by written notice within three months. Such notice shall be repeated at least once every three months so long as the system's failure continues or the variance or exemption remains in effect. If the system issues water bills less frequently than quarterly, or does not issue water bills, the notice shall be made by or supplemented by another form of direct mail.

(b) If a community water system has failed to comply with an applicable maximum contaminant level, the supplier of water shall notify the public of such failure, in addition to the notification required by paragraph (a) of this section, as follows:

(1) By publication on not less than three consecutive days in a newspaper or newspapers of general circulation in the area served by the system. Such notice shall be completed within fourteen days after the supplier of water learns of the failure.

(2) By furnishing a copy of the notice to the radio and television stations serving the area served by the system. Such notice shall be furnished within seven days after the supplier of water learns of the failure.

(c) If the area served by a community water system is not served by a daily newspaper of general circulation, notification by newspaper required by paragraph (b) of this section shall instead be given by publication on three consecutive weeks in a weekly newspaper of general circulation serving the area. If no weekly or daily newspaper of general circulation serves the area, notice shall be given by posting the notice in post offices within the area served by the system.

(d) If a non-community water system fails to comply with an applicable maximum contaminant level established in Subpart B of this part, fails to comply with an applicable testing procedure established in Subpart C of this part, is granted a variance or an exemption from an applicable maximum contaminant level, fails to comply with the requirement of any schedule prescribed pursuant to a variance or exemption or fails to perform any monitoring required pursuant to Section 1445(a) of the Act, the supplier of water shall give notice of such failure or grant to the persons served by the system. The form and manner of such notice shall be prescribed by the State, and shall insure that the public using the system is adequately informed of the failure or grant.

(e) Notices given pursuant to this section shall be written in a manner reasonably designed to inform fully the users of the system. The notice shall be conspicuous and shall not use unduly technical language, unduly small print or other methods which would frustrate the purpose of the notice. The notice shall disclose all material facts regarding the subject including the nature of the problem and, when appropriate, a clear statement that a primary drinking water regulation has been violated and any preventive measures that should be taken by the public. Where appropriate, or where designated by the State, bilingual notice shall be given. Notices may include a bal-

anced explanation of the significance or seriousness to the public health of the subject of the notice, a fair explanation of steps taken by the system to correct any problem and the results of any additional sampling.

(f) Notice to the public required by this section may be given by the State on behalf of the supplier of water.

(g) In any instance in which notification by mail is required by paragraph (a) of this section but notification by newspaper or to radio or television stations is not required by paragraph (b) of this section, the State may order the supplier of water to provide notification by newspaper and to radio and television stations when circumstances make more immediate or broader notice appropriate to protect the public health.

§ 141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of bacteriological analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

(1) The date, place, and time of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.

FRIDAY, JULY 9, 1976



PART II:

**ENVIRONMENTAL
PROTECTION
AGENCY**

■

**DRINKING WATER
REGULATIONS**

Radionuclides

RULES AND REGULATIONS

Title 40—Protection of Environment
CHAPTER 1—ENVIRONMENTAL
PROTECTION AGENCY
[FRL 552 2]

PART 141—INTERIM PRIMARY
DRINKING WATER REGULATIONS
Promulgation of Regulations on
Radionuclides

On August 14, 1975, the Environmental Protection Agency (EPA) proposed national interim primary drinking water regulations for radioactivity pursuant to sections 1412, 1445, and 1450 of the Public Health Service Act ("the Act"), as amended by the Safe Drinking Water Act, Pub. L. 93-523, 40 FR 34324. Numerous written comments on the proposed regulations were received, and a public hearing was held in Washington on September 10, 1975.

The regulations for radioactivity are hereby promulgated in final form. A number of changes have been made in the proposed regulations in response to comments received. These changes represent efforts to clarify what are necessarily technical and complex provisions and to make monitoring requirements more realistic. The proposed maximum contaminant levels for radionuclides have been retained as proposed.

The comments received on the proposed regulations and EPA's response to those comments are discussed in detail in Appendix A. The promulgated radionuclides regulations and Appendix A should be read in the context of the national interim primary drinking water regulations as a whole. The regulations concerning microbiological, chemical and physical maximum contaminant levels, and related regulations dealing with public notification of violations and reports and record-keeping by public water systems, were promulgated on December 31, 1975, 40 FR 59566.

The balance of this preamble discusses briefly the five major issues highlighted in the preamble to the proposed radionuclides regulations, and lists in summary form the changes made in the proposed regulations.

The preamble of the proposed regulations listed five issues on which comment was particularly requested:

1. The number and location of the public water systems impacted by the proposed maximum contaminant levels for radionuclides.
2. The number and location of water supplies requiring radium analysis at the proposed 2 pCi/liter gross-alpha-particle-activity screening level.
3. The estimated preliminary assessments of the costs and technology for radium removal.
4. The validity and appropriateness of an aggregate dose method for setting maximum contaminant levels.
5. The acceptability of a maximum contaminant level for radium of 5 pCi/liter as opposed to a higher or lower level.

Public Water Systems Impacted: Little significant information was provided with respect to the number of community water systems that may exceed the

proposed maximum contaminant levels. The State of Texas did report that 15 community water systems in that State would exceed the 5 pCi/liter limit for radium. EPA estimated in the preamble to the proposed regulations that a total of approximately 500 of the Nation's community water systems would exceed the proposed radium limit. It is likely that relatively few community water systems currently exceed the proposed maximum contaminant levels for either gross alpha particle activity or man-made radioactivity. Those levels are intended as preventative limits rather than as corrective limits.

Public Water Systems Requiring Radium Analysis: The monitoring requirements for the radium maximum contaminant level provide for an initial screening measurement of gross alpha particle activity to determine if analysis for radium-226 is needed. EPA requested comment on the number and location of community water systems that would exceed the proposed screening level of 2 pCi/l. A number of comments were received on the possible impact of the proposed screening level. The principal concern expressed was that a 2 pCi/liter screening level was unnecessarily low and would force a large number of public water systems to conduct expensive radium analyses in cases where the radium limit was not being exceeded.

A number of commenters were under the impression that radium daughter products were in equilibrium with radium in drinking water so that their accompanying alpha particle activity would be an indication of radium. Monitoring data from many public water systems indicates that because of differences in solubility and geological processes, the alpha particle activity is frequently much lower than would be observed for an equilibrium mixture of radium and daughter products and sometimes may be no greater than that due to radium-226 alone.

EPA agrees that in many cases adequate protection can be obtained with a screening level higher than 2 pCi/liter provided that the precision of the measurement is great enough to insure that the gross alpha activity is unlikely to exceed 5 pCi/l. The regulations have been amended accordingly. The effect of this change is that a screening test, in lieu of radium analysis, is permitted for most systems having gross alpha particle activities as high as 4 pCi/l. However, as noted in the Statement of Basis and Purpose for the proposed radionuclide regulations, care should be taken in evaluating the results of the screening test because the alpha particle activity screen does not measure radium-226, a beta emitter. For this reason, EPA recommends that, in localities where radium-226 may be present in significant quantities, the State establish a screening level no greater than 2 pCi/liter.

Costs and Technology for Radium Removal: One comment on radium removal costs stated that the EPA cost estimates may be too high because new

technologies for radium removal are being developed. Another comment stated that the EPA estimates appear "reasonable at this time," and a third that the estimates are "too general" in that system size was not considered.

As discussed in the Statement of Basis and Purpose for the proposed radionuclides regulations, costs for radium removal were found to be essentially independent of system size for systems treating less than three million gallons per day. Since there are no data indicating that the maximum contaminant level for radium is being exceeded in systems larger than this, the EPA cost estimates are valid.

Three commenters thought the cost projections for radium removal might be low because disposal of radium wastes was not considered. The Agency is presently conducting a research study to investigate disposal costs. Compared to industrial effluents containing radium, the amount of radium involved is quite small. The only available data indicate that a commercial waste disposal service for radioactive materials would be expected to cost about 50 cents annually per person served for radium disposal. However, costs will vary depending on locality and the disposal method used. It should also be noted that any radium disposal problems generated by the proposed regulations will not be unlike those already encountered by the many communities already removing radium as part of their water softening processing.

Other comments suggested consideration of occupational exposure to radium in water treatment plants. The Agency has made a limited examination of the levels of radiation in the vicinity of ion exchange units used to remove radium in operating water treatment plants. Exposure levels to operating personnel are measurable and occupational exposures could range up to 25-100 mrem/yr. These doses are well below the Federal occupational guides for radiation workers of 5000 mrem/yr. Appropriate Federal Radiation Guidance will be provided if future studies indicate the problem of occupational exposure to treatment plant personnel is serious.

One commentator questioned the efficiency of radium removal by ion exchange used in the cost analysis in Appendix V of the Statement of Basis and Purpose. That analysis shows that treatment cost is relatively independent of radium removal efficiency as long as removal exceeds 90 percent. Operating data from currently used municipal water treatment systems indicate that average radium removal efficiency throughout the exchange cycle ranges from 93 to 97 percent.

Aggregate Dose Level: As noted in the preamble to the proposed radionuclides regulations, 40 FR 34325, EPA considered but rejected the use of an aggregate dose level in establishing maximum contaminant levels. This approach would consider both the risk to individuals and the total risk to the population served, so that the maximum contaminant level would be inversely related, within lim-

its, to the size of the exposed population group. Comments on the concept of aggregate dose levels overwhelmingly endorsed EPA's decision not to use that approach in the development of maximum levels under the Safe Drinking Water Act.

Maximum Contaminant Level for Radium: A number of States submitted comments on EPA's proposal to establish the maximum contaminant level for radium at 5 pCi/liter. One State suggested that a limit of 10 pCi/liter be established for small public water systems. This suggestion has not been accepted by EPA because the legislative history of the Safe Drinking Water Act indicates that, to the extent possible, all persons served by public water systems should be protected by the same maximum contaminant levels. A number of other States expressed concurrence in the 5 pCi/liter limit.

One commenter cited the results of a U.S. Public Health Service study that indicated that persons in communities with water having a concentration of 4.7 pCi/liter had a higher mortality incidence due to bone sarcoma than persons in communities with water having less than 1 pCi/liter. The commentator contended that the USPHS study did not show a significant difference in cancer risk at a 95 percent confidence level, and that in any event the number of excess cancers was significantly less than would be predicted on the basis of the NAS-BEIR Report.

EPA notes that the confidence level of the USPHS study was 92 percent which is not significantly different from a 95 percent criterion considering the overall precision of the USPHS study. Mortality estimates on which the 5 pCi/liter limit was based included all cancers, not just bone sarcoma. Moreover, the EPA estimates are for lifetime exposures, whereas most of the participants in the USPHS study were exposed for a substantially shorter period of time. Moreover, the incidence of cancer observed in the USPHS study is somewhat greater than would be predicted by the linear dose response model used by EPA, not less as suggested by the commentator. Given these facts it is EPA's view that the USPHS study supports its use of risk estimates from ingested radium as a valid measure of the impact of various control levels. EPA will, however, study new cancer incidence data as they become available to determine whether the 5 pCi/liter level provides appropriate protection.

Changes Made in the Proposed Regulations:

In response to comments received on the proposed regulations, a number of changes have been made. The comments and changes are discussed in some detail in Appendix A. The following list summarizes changes which have been made:

1. Section 141.2 has been revised to simplify the definitions of "gross alpha particle activity" and "gross beta particle activity." As proposed these definitions were confusing because they sought to make distinctions which were more properly set forth in §§ 141.15 and 141.16.

2. Section 141.15 has been changed to make clear that the maximum contaminant level for gross alpha particle activity does not apply to isotopes of uranium and radon.

3. Section 141.16 has been redrafted for clarity and provisions relating to the means of determining compliance have been moved to § 141.26. It should be noted that the average annual concentration of strontium-90 yielding 4 mrem per year to bone marrow is 8 pCi/l not 3 pCi/l as was stated in the Proposed Regulations. Accordingly, Table A in Section 141.16 has been corrected and the detection limit for strontium-90 listed in Table B, § 141.25 has been changed to 3pCi/l.

4. Section 141.25 has been revised to include newer analytical methods and to delete some obsolescent methods. The definition of detection limit has been changed to indicate clearly that it applies only to uncertainty in the precision of the measurement due to counting errors. Also, a new detection limit of 4 pCi/liter has been established for gross beta particle activity so that gross beta analysis may be substituted for strontium-89 and cesium-134 analyses in some cases. It should be noted that under § 141.27 the State, with the concurrence of the Administrator, may authorize the use of alternative analytical methods having the same precision and accuracy as those listed in §§ 141.25 and 141.26.

5. Section 141.28 has been redrafted for clarity and the alpha particle activity screening level has been redefined to provide a higher gross alpha screening limit as long as the precision of measurement insures that the gross alpha activity is unlikely to exceed 5 pCi/l. Also, the requirement for quarterly sampling has been revised to permit a yearly sample where a one-year record based on quarterly sampling has indicated the average annual gross alpha particle activity and radium-226 activity to be less than half the applicable maximum contaminant level. The period allowed for initial monitoring has been extended to three years rather than two years after the effective date of these regulations. Also, rather than require that subsequent monitoring be every three years for ground water and every five years for surface water, monitoring for both ground water and surface water will be required every four years.

6. Section 141.28 has been amended to provide that, when ordered by the State, a community water system will be required to participate in a watershed monitoring program for man-made radioactivity. EPA recommends that States require such programs in each principal watershed under their jurisdiction. In addition, the provision allowing the use of discharge data from nuclear facilities in lieu of special monitoring for man-made radioactivity has been amended to allow only the use of environmental surveillance data taken in conjunction with the State. Also in § 141.26 a screening level for gross beta particle activity has been established to reduce the cost of monitoring water systems affected by nuclear facilities.

If any screening levels for gross beta particle activity are exceeded, identification of specific radionuclides is mandatory prior to public notification and initiation of any enforcement action. In addition to the gross beta particle activity measurement, it may be necessary, as new energy technologies become available in the future, to monitor for specific man-made contaminants other than those currently identified. The Act provides that these regulations may be amended from time to time.

EFFECTIVE DATE

Section 1412(a)(3) of the Act provides that "The interim primary regulations first promulgated . . . shall take effect eighteen months after the date of their promulgation." The interim primary regulations first promulgated were those for microbiological, chemical and physical contaminants. They were promulgated on December 24, 1975, and will become effective June 24, 1977. Because it is desirable that all of the basic interim primary drinking water regulations take effect on the same date, and in view of the long lead time provided to public water systems for compliance with these radionuclide regulations, the radionuclide regulations also will become effective on June 24, 1977.

It is hereby certified that the economic and inflationary impacts of these regulations have been carefully evaluated in accordance with Executive Order 11821, and it has been determined that an Inflation Impact Statement is not required. (The estimated ten million dollar annual cost is less than the one-hundred million dollar annual cost cut-off established as the minimum for which an Inflation Impact Statement is required.)

For the reasons given above, Part 141, Chapter 40 of the Code of Federal Regulations is hereby amended as follows:

RUSSELL TRAIN,
Administrator.

JUNE 23, 1976.

1. By revising § 141.2 to include the following new paragraphs (j) through (o):

§ 141.2 Definitions.

(j) "Dose equivalent" means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

(k) "Rem" means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A "millirem (mrem)" is 1/1000 of a rem.

(l) "PicoCurie (pCi)" means that quantity of radioactive material producing 2.22 nuclear transformations per minute.

(m) "Gross alpha particle activity" means the total radioactivity due to

RULES AND REGULATIONS

alpha particle emission as inferred from measurements on a dry sample.

(n) "Man-made beta particle and photon emitters" means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium-232, uranium-235 and uranium-238.

(o) "Gross beta particle activity" means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

2. By adding §§ 141.15, 141.16, 141.23 and 141.26 as follows:

§ 141.15 Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity in community water systems.

The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

(a) Combined radium-226 and radium-228—5 pCi/l.

(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)—15 pCi/l.

§ 141.16 Maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides in community water systems.

(a) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year.

(b) Except for the radionuclides listed in Table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents shall be calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure," NBS Handbook 69 as amended August 1963, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 millirem/year.

TABLE A.—Average annual concentrations assumed to produce a total body or organ dose of 4 mrem/yr

Radionuclide	Critical organ	pCi per liter
Tritium.....	Total body.....	30,000
Strontium-90.....	Bone marrow.....	4

§ 141.25 Analytical Methods for Radioactivity.

(a) The methods specified in *Interim Radiochemical Methodology for Drinking Water, Environmental Monitoring and Support Laboratory*, EPA-600/4-75-008, USEPA, Cincinnati, Ohio 45268, or

those listed below, are to be used to determine compliance with §§ 141.15 and 141.16 (radioactivity) except in cases where alternative methods have been approved in accordance with § 141.27.

(1) Gross Alpha and Beta—Method 302 "Gross Alpha and Beta Radioactivity in Water" *Standard Methods for the Examination of Water and Wastewater*, 13th Edition, American Public Health Association, New York, N.Y., 1971.

(2) Total Radium—Method 304 "Radium in Water by Precipitation" *Ibid.*

(3) Radium-226—Method 305 "Radium-226 by Radon in Water" *Ibid.*

(4) Strontium-89,90 — Method 303 "Total Strontium and Strontium-90 in Water" *Ibid.*

(5) Tritium—Method 306 "Tritium in Water" *Ibid.*

(6) Cesium-134 — ASTM D-2459 "Gamma Spectrometry in Water," 1975 *Annual Book of ASTM Standards, Water and Atmospheric Analysis*, Part 31, American Society for Testing and Materials, Philadelphia, PA. (1975).

(7) Uranium—ASTM D-2907 "Microquantities of Uranium in Water by Fluorometry," *Ibid.*

(b) When the identification and measurement of radionuclides other than those listed in paragraph (a) is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with § 141.27.

(1) *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions*, H. L. Krieger and S. Gold, EPA-R4-73-014, USEPA, Cincinnati, Ohio, May 1973.

(2) *HASL Procedure Manual*, Edited by John H. Harley, HASL 300, ERDA Health and Safety Laboratory, New York, N.Y., 1973.

(c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96 σ where σ is the standard deviation of the net counting rate of the sample).

(1) To determine compliance with § 141.15 (a) the detection limit shall not exceed 1 pCi/l. To determine compliance with § 141.15 (b) the detection limit shall not exceed 3 pCi/l.

(2) To determine compliance with § 141.16 the detection limits shall not exceed the concentrations listed in Table B.

TABLE B.—DETECTION LIMITS FOR MAN-MADE BETA PARTICLE AND PHOTON EMITTERS

Radionuclide	Detection limit
Tritium.....	1,000 pCi/l
Strontium-90.....	10 pCi/l
Strontium-90.....	2 pCi/l
Iodine-131.....	1 pCi/l
Cesium-134.....	10 pCi/l
Gross beta.....	4 pCi/l
Other radionuclides	1/10 of the applicable limit

(d) To judge compliance with the maximum contaminant levels listed in sections 141.15 and 141.16, averages of

data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

§ 141.26 Monitoring Frequency for Radioactivity in Community Water Systems.

(a) Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

(1) Initial sampling to determine compliance with § 141.15 shall begin within two years of the effective date of these regulations and the analysis shall be completed within three years of the effective date of these regulations. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analyses of four samples obtained at quarterly intervals.

(i) A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis. Provided, That the measured gross alpha particle activity does not exceed 5 pCi/l at a confidence level of 95 percent (1.65 σ where σ is the standard deviation of the net counting rate of the sample). In localities where radium-226 may be present in drinking water, it is recommended that the State require radium-226 and/or radium-228 analyses when the gross alpha particle activity exceeds 2 pCi/l.

(ii) When the gross alpha particle activity exceeds 5 pCi/l, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/l the same or an equivalent sample shall be analyzed for radium-228.

(2) For the initial analysis required by paragraph (a) (1), data acquired within one year prior to the effective date of this part may be substituted at the discretion of the State.

(3) Suppliers of water shall monitor at least once every four years following the procedure required by paragraph (a) (1). At the discretion of the State, when an annual record taken in conformance with paragraph (a) (1) has established that the average annual concentration is less than half the maximum contaminant levels established by § 141.15, analysis of a single sample may be substituted for the quarterly sampling procedure required by paragraph (a) (1).

(i) More frequent monitoring shall be conducted when ordered by the State in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or ground water sources of drinking water.

(ii) A supplier of water shall monitor in conformance with paragraph (a) (1) within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when ordered by the State in the event of possible contamination or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water.

(iii) A community water system using two or more sources having different con-

RULES AND REGULATIONS

centrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when ordered by the State.

(iv) Monitoring for compliance with § 141.15 after the initial period need not include radium-226 except when required by the State. *Provided*, That the average annual concentration of radium-226 has been assayed at least once using the quarterly sampling procedure required by paragraph (a) (1).

(v) Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/l, when ordered by the State.

(4) If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in § 141.15 is exceeded, the supplier of a community water system shall give notice to the State pursuant to § 141.31 and notify the public as required by § 141.32. Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

(b) Monitoring requirements for man-made radioactivity in community water systems.

(1) Within two years of the effective date of this part, systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the State shall be monitored for compliance with § 141.16 by analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. Compliance with § 141.16 may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/l and if the average annual concentrations of tritium and strontium-90 are less than those listed in Table A. *Provided*, That if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

(i) If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with § 141.16.

(ii) Suppliers of water shall conduct additional monitoring, as ordered by the State, to determine the concentration of man-made radioactivity in principal watersheds designated by the State.

(iii) At the discretion of the State, suppliers of water utilizing only ground waters may be required to monitor for man-made radioactivity.

(3) For the initial analysis required by paragraph (b) (1) data acquired within one year prior to the effective date of this part may be substituted at the discretion of the State.

(3) After the initial analysis required by paragraph (b) (1) suppliers of water

shall monitor at least every four years following the procedure given in paragraph (b) (1).

(4) Within two years of the effective date of these regulations the supplier of any community water system designated by the State as utilizing waters contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended.

If the gross beta particle activity in a sample exceeds 15 pCi/l, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/l, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with § 141.16.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

(iv) The State may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the State determines such data is applicable to a particular community water system.

(5) If the average annual maximum contaminant level for man-made radioactivity set forth in § 141.16 is exceeded, the operator of a community water system shall give notice to the State pursuant to § 141.31 and to the public as required by § 141.32. Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.

FEASIBILITY STUDY FOR DEVELOPMENT AND IMPLEMENTATION
OF A MODEL STATE INFORMATION SYSTEM
FOR EPA's SAFE DRINKING WATER PROGRAM

PREPARED FOR THE OFFICE OF WATER SUPPLY

ENVIRONMENTAL PROTECTION AGENCY

June 15, 1976

PREFACE

This report presents the findings of a feasibility study for development and implementation of a model state information system for EPA's Safe Drinking Water Program. The conceptual basis for this information system is described in Program Evaluation Requirements, Concepts and Plans for the EPA Safe Drinking Water Program, Office of Water Supply, EPA, October 1975. And the general design of a customized Model State Information System is contained in four volumes supplied to EPA concurrently with this report. Details regarding the various subsystems, inputs, outputs and file structures are presented in these volumes and are therefore not repeated here.

FEASIBILITY STUDY FOR DEVELOPMENT AND IMPLEMENTATION OF A MODEL STATE INFORMATION SYSTEM FOR EPA'S SAFE DRINKING WATER PROGRAM

EXECUTIVE SUMMARY

The Safe Drinking Water Act of 1974 greatly expands the U.S. Environmental Protection Agency's responsibilities for monitoring the quality of drinking water in the United States. The Act enfolds all public water systems under the regulatory umbrella of EPA, but provides for a joint federal-state enforcement system for ensuring the quality of drinking water.

Under the authority invested in EPA by the Act, the first set of regulations entitled "National Interim Primary Drinking Water Regulations" were issued in December 1974. These regulations established maximum contaminant levels for specified contaminants and prescribed procedures for sampling and monitoring water quality beginning June 1977. Although most states already have some form of program to monitor drinking water quality, the extensive sampling and reporting requirements prescribed by EPA will significantly increase the administrative and regulatory burden at the state and federal level.

A preliminary survey of selected states in 1975 confirmed the EPA's belief that a computer-based information system would be required by most states to effectively monitor the program. Rather than have individual states embark on separate paths toward computer system development, the U.S. EPA decided to develop a Model State Information System (MSIS) to assist the states and regions in implementing the program.

A key decision in the implementation of this MSIS is whether the system should be made available to the states to operate on computer facilities of their choice, or the system be installed only at the central EPA computer facility, accessed by the states and regions through telecommunications. This analysis was undertaken to assist EPA in making this determination.

American Management Systems, Inc. (AMS) analyzed the feasibility, resource requirements and cost estimates for developing, installing, and operating the MSIS under three systems options:

- a decentralized custom MSIS developed specifically to address the minimum requirements of the Safe Drinking Water Program and made available to states to operate on a facility of their choice; the system would be supported by the central EPA facility for use by regions and states choosing the central EPA facility.
- a centralized custom MSIS developed as in option 1 but supported only at the central EPA facility, and

- a centralized MSIS based on STORET, the general purpose data storage and retrieval software used in monitoring water quality.

As an important part of the feasibility analysis, AMS visited 24 states and the 10 EPA Regional Offices. Our analysis is based on the data collected at these site visits. Following the site visits, EPA obtained critical information on state preferences and data processing capabilities through a simplified questionnaire administered by the regions to states not included in the original sample. This additional data generally supports the information collected in the survey.

As Table ES-1 shows, 31 of the 40 responding states indicated a strong preference for a decentralized system, with 22 states essentially agreeing to use an EPA developed MSIS. Most of the six states desiring a centralized MSIS stated that they do not have ready access to a state computer system.

TABLE ES-1
STATE PREFERENCES FOR MSIS

	<u>Number of Responses</u>
<u>Decentralized System</u>	
• EPA developed MSIS	22
• state developed system	6
• manual system	3
Sub-total	<u>31</u>
<u>Centralized System</u>	
• STORET-based MSIS	2
• EPA developed MSIS	4
Sub-total	<u>6</u>
Data not available	<u>3</u>
TOTAL All Responses	<u><u>40</u></u>

Key Findings

A vast majority of the states surveyed indicated a very strong preference for the decentralized custom MSIS. The states generally prefer to have the system under their control, especially a routine operational system for a program the states are responsible for monitoring. Individual states will undoubtedly wish to extend the use of the MSIS to suit their specific requirements; this tailoring is probably best accomplished in a decentralized system. One of EPA's major concerns regarding MSIS was the ability of state data processing capabilities to support a decentralized MSIS. Our survey and analysis indicate that by and large most states possess the ADP capability and the capacity to operate and maintain such a system. 21 of the 40 states responding to our survey reported OS based IBM facilities; 11 states reported other manufacturer's hardware, and eight were unable to provide data on their data processing capabilities. Finally, in terms of cost analysis for development and operation, our estimates show that the decentralized custom system would cost less to develop and operate.

Our estimates show that the development of the custom MSIS would cost between \$183,000 and \$231,000 for contracted professional services; in comparison, the STORET-based MSIS would cost about \$204,000 if developed under contract with an outside vendor. The STORET group estimates development costs of about \$128,000 for in-house development of a STORET-based MSIS, the major difference being in the substantially lower daily rates used. However, EPA does not have the resources to develop an MSIS in-house and the STORET group estimates a requirement for three additional people who would then need to be trained in the use of STORET.

The decentralized operation is especially attractive since it does not create a huge demand on the federal EPA for continuing system support, computer facilities, and the problems of managing a complex telecommunication-based system.

The volume of data to be processed by the MSIS is considerable (estimated daily volume of 26,000 transactions nationwide when the non-community systems are included) and if the centralized option is selected, it will result in a system roughly the size of the current STORET system of EPA's central facility.

For these reasons, we feel that the decentralized custom system will best serve the intent of the Safe Drinking Water Program. However, the development of an MSIS is a major undertaking, especially considering the time schedule imposed by the regulations -- June 1977. Continuous and effective project management will ultimately determine the success or failure of this endeavor, especially the manner in which the system is tested centrally before being delivered to the states for installation, and the initial support provided by the federal EPA to the states and regions. One of the chief reasons for the problems encountered by EPA in developing decentralized systems in the past has been the lack of adequate systems testing before installation at the state level. In order to assist the EPA to effectively manage the development, testing, and installation of MSIS, we have provided as part of this effort a detailed task plan and schedule for each step in system development.

Option 2 of the centralized custom MSIS offers no significant advantage over the decentralized option, especially since it will be almost impossible to withhold the software from a state that requests it. The administrative structure, computer facilities, and the telecommunications network require not only a significant front-end investment but also a high level of continuing effort by the federal EPA. And there is no guarantee that states will use the centralized system. Generally, a centralized data base is effective if several different users require immediate access to most recent and detailed data. In this instance, the federal EPA or other states do not need immediate access to detailed data maintained for an individual state; EPA's major role is that of providing the support needed to initiate the program and keep it functioning effectively at the state and regional level. This is best accomplished through a decentralized custom system.

The final option of using STORET to perform the data storage and retrieval functions of an MSIS also suffers from all the drawbacks outlined for the centralized system. In our judgment STORET is not suitable for a production-type management information system. It was designed to process parametric data, and performs its intended functions effectively and adequately.

To try and adapt it for an application it was not designed for surely decreases the probability of obtaining an operational system to serve the needs of the Safe Drinking Water Program. Additionally, the EPA does not currently possess the required manpower resources to develop a STORET-based MSIS. The knowledge of STORET is not a generally available commodity so even if additional persons are added to the internal staff, or the development is contracted out, there would be at least some time lag before these individuals can be comfortable enough with the STORET environment to design and develop an MSIS based on STORET. The schedule imposed by the National Interim Primary Drinking Water Regulations renders each day critical for MSIS development. The problem is further complicated by the lack of adequate documentation of the STORET software.

Thus, in balance, we feel that the decentralized custom MSIS represents EPA's best chances for a successful system; however, we once again stress the strong need for effective management of the system development if MSIS is to be ready for use by at least some states in June 1977.

Summary of Costs

An important part of analysis focused on the costs of developing, installing, and operating an MSIS under each major option. Table ES-2 summarizes MSIS development cost estimates for a custom system and the STORET-based option. Resource requirements for MSIS development (in terms of person-months) are estimated to be roughly the same for both options of the MSIS; as a result, the cost to EPA of developing the system under contract will be roughly similar under either option. The in-house development cost estimate for the STORET option is based on an internal price which does not take into account the fact that additional resources acquired for this development effort represent a cost in perpetuity to EPA.

TABLE ES-3
ESTIMATED INSTALLATION COSTS OF A MODEL STATE INFORMATION SYSTEM
FOR THE SAFE DRINKING WATER PROGRAM

	<u>Decentralized System</u>	<u>Centralized System (custom and STORET options)</u>
Estimated Person-days		
• General tasks for all states	38	38
• Average per state	55-66	49
Total Person-days for 49 installations	2,978	2,439
Estimated Cost @ \$200 per day	\$595,600	\$487,800

Finally, our estimates for the ongoing operating costs of MSIS are displayed in Table ES-4. The table contains our estimates of required manpower as well as data input and computer operating costs for the basic package and full MSIS for the first and third year of operations. Our estimates show that for the decentralized system, EPA will need a full-time person at the center and approximately three-quarters of a full-time person at the regions. Operating costs under the decentralized system will range from an estimated \$704,000 in the first year for the basic package to \$2.1 million in the third year for the full package. In the long run, the full package estimates constitute more reasonable planning guides since the states will probably extend the applications of MSIS as they become more familiar with it. Centralized options are estimated to make significantly more demands on resources at EPA headquarters and regions; moreover, operating costs are estimated to be higher in the centralized options chiefly because of the administrative and technical problems in interfacing with a centralized facility.

In conclusion, therefore, we find that:

- Estimated operating costs are not significantly different under any option for the MSIS,

- Systems development and installation costs would be significantly lower if EPA developed and installed the system with in-house resources; however, EPA does not have adequate resources to effectively accomplish this task,
- If the development of MSIS is contracted out, the costs of development and installation are estimated to be roughly similar under any selected option,
- Therefore, on a cost basis, no single option would provide an overriding reason for its selection.
- On the other hand, the intent of the legislation, its intent for joint federal-state enforcement, and the states' preferences and data processing capabilities argue very strongly for a decentralized custom MSIS.

**INTRODUCTION TO THE
MODEL STATE INFORMATION SYSTEM (MSIS)**

Prepared For The

**OFFICE OF WATER SUPPLY
ENVIRONMENTAL PROTECTION AGENCY**

June 15, 1976

I. OVERVIEW

The Model State Information System (MSIS) is a computer-based information system for use by individual states in managing the increased volume of water quality and related data that will be required to implement the recently promulgated National Interim Primary Drinking Water Regulations. While it is primarily designed for those states that do not currently have an automated system, it is also designed to provide enhanced capabilities to states with automated systems.

Principal Functions

States will have the option of selecting a base package of features, plus one or more optional features, depending on their volume of data and individual preferences. The system will perform the following principal functions:

Base Package

- Maintain records of each public water system in a state, containing such information as the name, address, population served, number of service connections, source of water, and treatment techniques used.
- Maintain records of samples and laboratory tests and provide detail and summary reports to state water supply managers on violations of the regulations.
- Maintain accurate and up-to-date records of regulatory requirements, such as MCLs and monitoring frequencies.
- Provide compliance data to EPA in computer compatible form on at least an annual basis.

Optional Features:

- Maintain records of compliance schedules under variance and exemption (V&E) agreements and produce reports of compliance with scheduled milestones.
- Provide a capability to automatically schedule periodic sanitary surveys based on priority factors such as population served and compliance history, in addition to date of last survey.
- Maintain records of specific enforcement actions to assist in case tracking and compliance monitoring.
- Provide a capability to manage data on certified operators and automatically print mailing labels for rapid and inexpensive communication with target populations such as water supply operators, laboratories, and local health officials.

Key Benefits

MSIS will provide states with these key benefits:

- Reduction in administrative costs of implementing the new regulations by utilizing efficient computer-based techniques rather than manual recordkeeping. Costs of manual systems increase linearly with workload; costs of computer-based systems do not.
- Greatly reduced costs of software development, training, and installation by using the EPA developed system instead of a custom built system.

- Timely and accurate reports of compliance with both Federal and state drinking water regulations.
- Positive control over sampling programs of local water suppliers with an optional, computer-initiated sample scheduling feature and appropriate audit trails.
- Better utilization of scarce technical manpower by priority targeting of state inspection programs.
- Automatic monitoring of compliance schedules under variances and exemptions.

Legal Issue

MSIS computer records and computer printed reports are not necessarily legally admissible as evidence. State laws differ in this regard; states planning to use MSIS should obtain a legal opinion from their state's chief legal officer before relying solely on computer stored information as evidence.

III. OPERATIONAL HIGHLIGHTS

The previous section described MSIS components and presented a static picture. In this section we describe MSIS as a process, beginning with how the system is set up, continuing with regular, scheduled operations, and concluding with optional, non-recurrent processing.

A. Setting-up MSIS

Before MSIS can function, its operating environment must be prepared. In general, the following steps should be followed:

1. A review, by water supply control and data processing personnel, of MSIS documentation.
2. A decision on which subsystems to implement.
3. Design and preparation of input and output forms, based on state regulations and preferences, and on form prototypes provided with MSIS documentation.
4. Programs installation. This step includes copying the MSIS programs to the states' computer programs library and verifying that they can operate on the state computer.
5. Tables preparation. This step includes preparation of code tables as required by various programs of MSIS, such as the Regulations Table (the input for the Federal regulations will be supplied as a punched cards deck), and the Laboratory Table.
6. Create initial PWS Inventory File. The first version of the PWS Inventory File (PWSIF), will be supplied by EPA on a magnetic tape which is prepared from information that exists on the National PWS Inventory File. When all the previous steps are completed, the file is listed to provide a comprehensive list of all PWS records on the file. A review of the list is required to correct, add and change the information, using the programs of the PWS Inventory Subsystem. By the end of the review period, a basic inventory file of public water systems is ready.

7. Determine operations schedule. MSIS is designed to offer the states flexibility to choose their individual operations schedules, and the final step of the set-up phase is to adopt a run schedule for each subsystem.

B. Regular Production

1. PWS Inventory Subsystem

A periodical (e.g. bi-weekly) updating of the PWSIF is all that is required as a regular production of this subsystem except during the first two years while many new non-community PWSs are being posted to the file and more frequent production may be needed.

2. The Water Quality Compliance Subsystem

a. Compliance Cycle

This subsystem is designed to be processed periodically in accordance with PWS reporting periods (typically a month or a quarter. In order to achieve an even spread of the work through the month, a state may wish to allocate PWSs into several compliance cycles, by defining the day in the month on which a PWS must report. Suppose that a state has to monitor 5000 PWSs; they may be divided equally between four cycles. By assigning the numbers - 01, 08, 15, and 22, it is known to MSIS which PWS must report on the first, second, third, and fourth week of the month. This arrangement means that for every week it is checked whether all PWSs that must have to report by that date (and allowing 10 more days for data entry) have done it.

b. Scheduling PWSs for sampling

Each week the scheduling modules scan the PWSIF and identifies PWSs required to submit sample analysis results. All the necessary reporting forms are printed and mailed to those PWSs (including sample bottles) thus notifying them in advance of the contaminants and number of samples required, and providing them with the necessary input forms. PWSs should use these forms for submitting samples for analysis and for reporting to the state.

c. Data Entry

Results of analysis are received daily from the laboratories, keyed, and entered to the system. This process has to repeat two to three times a week, depending on data volume. Following each data entry run an error report is produced, listing sample data that was rejected during data

entry. This data must be checked, corrected, and reentered in the next data entry run.

d. Compliance Reporting

A periodic summary process summarizes the data that has been entered during the period and produces compliance reports showing PWSs that did not comply with sampling requirements and water quality standards (MCL). A Violation File is updated with records containing the details of these violations, and data on other violations through manual inputs. The sum of all the violations posted to the Violations File is produced in one report showing, by PWS, all violations that were detected.

e. Summary

The basic sequence of production during one reporting period is: scheduling, input of sample data, summary of sample data, and reporting. It should be noted that the character of MSIS as a batch system means that identification of violation will lag after the occurrence and so the Water Quality Compliance Subsystem cannot replace a telephone call from a laboratory.

3. Regulation Subsystem

There is no need to operate this subsystem unless there was a change in the regulations in which case the applicable input forms are filled, keyed and entered. Output reports must be carefully verified to ensure that the Regulations Table is correct and if any errors were detected, they must be corrected by repeating the process until errors are no longer detected.

4. Federal Reporting Subsystem

The regular production of this subsystem in an annual run which produces the files and reports that are required under the National Interim Primary Drinking Water Regulations.

5. Variances and Exemptions Subsystem

This is an optional feature of MSIS. The Variances and Exemptions File (VEF) is built gradually over time by entering new V&E's data to the subsystem. The production cycle will generally be monthly: data is entered

and after it is cleared of errors, the two monthly reports are produced:

- a. Projected Milestones
- b. Late Milestones

These reports perform the function of alerting states' personnel to PWS that must report completion of a milestone and PWSs that did not do so, thus enabling the state to take proper action.

6. Sanitary Survey Subsystem

There are two distinct phases in operating this optional subsystem.

- a. To establish the proper combination of parameters applied to the algorithm for surveyselection. Once the formula is found, it need not be changed unless the states approach has been changed.
- b. The regular production will generally consist of a monthly production of a list of PWSs that are scheduled for sanitary survey, the results of which are used to update the PWSIF.

7. Enforcement Actions Subsystem

This is an optional feature of MSIS. When a state wishes to implement the subsystem it starts by building the Enforcement Actions File (EAF) as enforcement actions are taken. The only regular process associated with this subsystem would be monthly data entry and update; report production is only by request.

8. Operator and Mailing Subsystem

This subsystem, too, is an optional feature. The Operator and Mailing File (OMF) is created initially by entering the data about all known operators and addressees. From then on regular production is done monthly or bi-weekly and consists of data entry and updating the OMF; report production is on request only.

C. Optional Production

Regular production, as described above, is adequate for collection and maintenance of data and for monitoring compliance during the current reporting period, but state officials may wish to use the data they maintain for other purposes. For example, it may be necessary to identify all public water systems using a specific treatment method; to schedule classes for certified operators; to review all enforcement actions cases which are still pending, etc.

In order to accomodate such ad hoc production, MSIS provides a simple selection language. Requests for a retrieval of specific data are submitted to a "selection process" which performs the task of applying selection criteria to MSIS files, retrieving the requested data and displaying it as required. MSIS selection capabilities are not the same as a report generator because report formats are fixed; the user controls the data to be displayed rather than the exact format. This drawback is partially compensated by having a variety of report formats. States which employ large computer systems usually have one or more general purpose report generators installed (e.g. EASYTRIEVE, DYLACOR). By using such software they can easily obtain additional report formats.

A report selection process is designed for the following subsystems:

- Public Water Systems Inventory
- Water Quality Compliance
- Variances and Exemptions
- Enforcement Actions
- Operator and Mailing

It should be noted that although the process of scanning a file, selecting and sorting the required data and producing a report involved several steps the user is unaware of since it is done as one production job. The formats to be used in requesting special reports will be developed during detailed design.

The following example demonstrates how the selection process can be used:

A state may change the MCL for turbidity for an individual PWS from 1 TU to 5 TU. Assume that state officials want to review all PWSs for which an MCL of more than 1 TU is allowed, and that the drinking water control function is decentralized.

A request is submitted to produce the State Discretionary Data report (see section I.A) by selecting all PWSs that are allowed a modified MCL for turbidity of more than 1 TU. The data is to be sorted by regional office and PWS name.

Following the production, a list of PWSs is sent for review by each regional office.

II. System Overview

A. Introduction

The Model State Information System (MSIS) is a computer based information system designed to be used by the individual states and regional offices to meet the requirements of the "National Interim Primary Drinking Water Regulations" (December, 1974). These regulations were formulated by the U.S. Environmental Protection Agency under the authority of the Safe Drinking Water Act of 1974.

Using as a basis the Program Evaluation Requirements, Concepts and Plans for EPA Safe Drinking Water Program (Office of Water Supply, EPA, October 1975), American Management Systems, Inc. (AMS), performed a feasibility study and general systems design of the Model State Information System (June 15, 1976). Detail systems design, programming, testing, and documentation was carried out by SouthWestern Ohio Regional Computer Center (SWORCC).

MSIS is made up of five required subsystems and four optional subsystems. The five required subsystems are:

- Public Water System Inventory Subsystem (PWSI)
- Regulations Subsystem (REGS)
- Water Quality Compliance Subsystem (WAQC)
- Federal Reporting Subsystem (FEDR)
- Standard Processing Subsystem (MSIS)

The four optional subsystems are:

- Variances and Exemptions Subsystem (VAEX)
- Enforcement Actions Subsystem (ENAC)
- Sanitary Survey Subsystem (SRVY)
- Operator and Mailing Subsystem (OPER)

B. General system Approach

The Model State Information System (MSIS) is designed to be standard enough that the individual states can use it on their various computer systems. At the same time, MSIS is flexible enough that the states may select segments of the system that fit their needs and may even easily modify the system to add to its functions.

Modularity of MSIS allows for flexibility. In order to give the States and regions the capability to fulfill their basic responsibilities to OWS, a minimum of five subsystems are required to do MSIS processing. They are the Public Water System Inventory Subsystem, the Water Quality Compliance Subsystem, the Regulations Subsystem, the Federal Reporting Subsystem, and the Standard Processing Subsystem. Four additional subsystems may be added, each at the discretion of the State or Region: the Variances and Exemptions Subsystem, the Sanitary Survey Subsystem, the Enforcement Actions Subsystem, and the Operator and Mailing Subsystem. In this way, the state may selectively add to or replace functions they currently have.

Within the subsystems, there is a built-in flexibility allowing the states to mold the system to better meet their individual needs. As an example, the Regulations Subsystem allows the states to input state regulations in addition to the required federal regulation. Flexibility is also given in report generation by allowing the state to select what information is to be contained on fixed format reports and in what order the report is produced. It must be emphasized, however, that any major changes may also require programming changes.

To contribute to the uniformity of MSIS, the following functions were standardized:

- . File Maintenance
 - . Error Processing
 - . History Processing
 - . Report Generation
 - . Data Editing
1. File Maintenance

Adds:

The initial creation of a record on an MSIS file is accomplished with an ADD transaction (code 00) which must contain all information necessary for processing by MSIS before it can be accepted.

Updates:

Existing data is modified by Update transactions. New data is edited and applied to the files field by field. An erroneous transaction field will not cause the entire transaction to be rejected. Instead, valid fields will be updated and only erroneous fields will need to be corrected and reentered. Since most update transactions refer to several data elements, the following approach is used:

- a. If a data element field is blank, the data element on the file is not modified.
- b. If the data element field contains a "\$" in the leftmost position, the data element is reinitialized (existing data is replaced with blanks or zeros).
- c. If transaction code "99" is used, the entire record is flagged as deleted. The only exception is in the Water Quality Compliance Subsystem, program WAQC010, where the delete transaction code is "01".
- d. All other values can be used to replace the current value of the data element in the file provided that the new data is valid. Refer to the Data Element Dictionary (DED) to find the edit criteria for data elements.

2. Error Processing

Prior to actual processing, however, errors in processing options records must be handled in the individual programs. Errors created during actual processing of create and update modules in MSIS are handled by Standard Error Processing, a part of the Standard Processing Subsystem (MSIS). These errors created while updating or maintaining files, create the Standard Error File (SEF).

The SEF is processed by Standard Error Processing program (MSIS010) using the Error Message Table (ENT), to interpret the errors, and creating the Data Entry Error Report (Exhibit MSIS.313).

The Optional Error File (OEF) is an optional file which may be produced during Standard Error Processing so that the errors can be corrected by some text editing facility.

3. History Processing

In order to maintain an audit trail of the more important files of MSIS, two history processes are used. The Standard History Processing programs (MSIS.020,040,050), a part of the Standard Processing Subsystem, are used to record and make use of a history of all changes made to the Violations File (VIP), the Variances and Exemptions File (VEF), the Enforcement Actions File (EAF), and the Operator and Mailing File (OMF). These history records are maintained on the Standard History File (SHF).

The Public History File (PHF) is used to maintain a similar audit trail for the more complicated Public Water File (PWF) within the Public Water System Inventory Subsystem, (PWSI.070, 080, 090).

4. Report Generation

To permit the user to select and order records from files according to very flexible criteria, standard selection and sort methods are used throughout MSIS. Standard selection and sort processing options formats are used in all MSIS programs.

The selection process allows a maximum of thirty-five (35) data elements to be used as keys to determine if the data record qualifies to be selected. The user, therefore, can have an ample range for selecting records to be reported.

Additionally, the user has the option to have the records sorted in a meaningful sequence for the generation of a report. The user must keep in mind the length of the data elements to be used for sorting. A maximum of thirty (30) characters, accumulating all the lengths of the data elements, is allowed with no one length being greater than fifteen (15). Any data element with a length greater than fifteen will only use the first fifteen characters of the data element for sorting.

5. Data Editing

Some edit criteria is contained in the Code Value Table (CVT). The CVT contains acceptable data values in separate files for the eight subsystems of MSIS and one file of common data element values shared by two or more subsystems. (These common data elements are listed in Appendix A of the Data Element Dictionary). The CVT is used whenever possible to determine acceptable values.

C. Naming Conventions

1. File Name Abbreviations

Each file and table has associated with it a three letter abbreviation used in the full, programming name as an abbreviation for the file and a two letter mnemonic prefix used in the files' data element mnemonic names.

File Name	File ID	Mnemonic Prefix	Subsystem
Code Value Table	CVT	CV	MSIS
Compliance Status File	CSP	(none)	WAQC
Data Element Table	DET	DE	MSIS
Deviations File	DVP	(none)	FEDR
Enforcement Actions File	EAP	EA	ENAC
Error Message Table	EMT	EM	MSIS
Laboratory Table	LBT	LB	WAQC
Optional Error File	OEF	OE	MSIS
Operator and Mailing File	OMF	OM	OPER
Public History File	PHF	PH	PWSI
Periodic Sample File	PSF	PS	WAQC
Public Water File	PWF	PW	PWSI
Public Water Table	PWT	PT	PWSI
Regulations File	RGF	RG	REGS
Sample Analysis File	SAP	SA	WAQC
Standard Error File	SEF	SE	MSIS
Standard History File	SHF	SH	MSIS
Variances and Exemptions File	VEF	VE	VAEX
Violations File	VIF	VI	WAQC

2. COBOL Programming Names

The file and table data element names used in programming are assigned using the three letter file ID followed by a dash and a one (1) to twenty-six (26) character descriptive name. Example: PWF-PLANT-POPULATION-SERVED. (ANSI COBOL allows a maximum of thirty characters for a data name.)

3. Mnemonic Names

The Data Elements of some of the permanent files and tables have mnemonic names in addition to the COBOL programming names. The mnemonic name is formed using the two letter mnemonic prefix followed by a dash and a one (1) to seven (7) character abbreviation of the descriptive portion of the corresponding programming name. Example: PW-PL-POPL for PWF-PLANT-POPULATION-SERVED. The mnemonic names are used when filling in the SORT and SELECTION processing option forms, and also appear on the Standard Error Report.

4. Exhibits

Exhibit numbers are prefixed by the four letter subsystem prefix followed by:

- A. 100-199 for input forms
- B. 200-299 for record definitions
- C. 300-399 for report layouts
- D. 400-499 for turnaround documents

D. Files and Tables

The following are the permanent files and tables of MSIS. They are listed by the subsystem responsible for the files' creation.

1. **Public Water System Inventory Subsystem (PWSI)**
 - a. **Public Water File (PWF)**, Exhibit PWSI.200, Data Element Catalogue Numbers 145 through 264, 701 and 702: The PWF is a variable length, sequential access file of detailed information about all Public Water Systems in the state.
 - b. **Public Water Table (PWT)**, Exhibit PWSI.201, Data Element Catalogue Numbers 265 through 278, and 703: The PWT is a fixed length, direct access file of selected information from the PWF used primarily for supplying information on reports throughout MSIS.
 - c. **Public History File (PHP)**, Exhibit PWSI.202, Data Element Catalogue Numbers 310 through 318: The PHP is a fixed length, sequential access history file of all modifications to the PWF used as an audit trail of the file.
2. **Regulations Subsystem (REGS)**
 - a. **Regulations File (RGF)**, Exhibit 250 through 257, Data Element Catalogue Numbers 1 through 144: The RGF is a fixed length, sequential access file of all state and federal drinking water quality regulations.
3. **Water Quality Compliance Subsystem (WAQC)**
 - a. **Periodic Sample File (PSF)**, Exhibit WAQC.252, Data Element Catalogue Numbers 399 through 429, 817 and 818, and 900 through 902: The PSF is fixed length, sequential access file of all water quality sample transactions.
 - b. **Sample Analysis File (SAF)**, Exhibit WAQC.254, Data Element Catalogue Numbers 356 through 392, 807 through 816. The SAF is a fixed length, sequential access file containing a record for each chemical or radiological sample and a summary record of bacteriological and turbidity samples. The SAF is a summary of the PSF used to reduce the great numbers of sample records kept.
 - c. **Violations File (VIP)**, Exhibit WAQC.255, Data Element Catalogue Numbers 326 through 355 and 800 through 806, and 819. The VIP is a fixed length,

sequential access file of the violations to the drinking water regulations.

d. Laboratory Table (LBT), Exhibit WAQC.250, Data Element Catalogue Numbers 319 through 325 and 820: The LBT is a fixed length, direct access file of laboratories authorized to analyze water samples.

e. Compliance Status File (CSF), Exhibit WAQC.257, Data Element Catalogue Numbers 516 through 533. The CSF is a fixed length, sequential access file of information which deals with compliance determination.

4. Federal Reporting Subsystem (FEDR)

a. Deviations File (DVF), Exhibit FEDR.202, Data Element Catalogue Numbers 492 through 511: The DVF is a fixed length, sequential access file of violations, variances, and exemptions. The DVF is created in FEDR for submission to EPA.

5. Standard Processing Subsystem (MSIS)

a. Code Value Table (CVT), Exhibit MSIS.206, Data Element Catalogue Numbers 279 through 284: The CVT is a fixed length, sequential access file of data element values used in editing in MSIS.

b. Data Element Table (DET), Exhibit MSIS.201, Data Element Catalogue Numbers 285 through 293: The DET is a fixed length, sequential access file of data element information used in MSIS.

c. Error Message Table (EMT), Exhibit MSIS.205, Data Element Catalogue Numbers 294 through 297: The EMT is a fixed length, sequential access file of error codes and associated messages used in standard error processing.

d. Optional Error File (OEF), Exhibit MSIS.215, Data Element Catalogue Numbers 308 and 309: The OEF is a fixed length, sequential access file of errors created during MSIS processing used for correcting the errors using text editing facilities.

e. Standard Error File (SEF), Exhibit MSIS.207, Data Element Catalogue Numbers 298 through 300: The SEF is a fixed length, sequential access file of errors created during processing in MSIS.

f. Standard History File (SHF), Exhibit MSIS.202 Data Element Catalogue Numbers 301 through 307:

The SHP is a fixed length, sequential access file of changes made to the Violations File (VIP), the Enforcement Actions File (EAF), the Variances and Exemptions File (VEF), and the Operator and Mailing File (OMF).

6. Variances and Exemptions Subsystem (VAEX)

- a. Variances and Exemptions File (VEF), Exhibit VAEX.212, Data Element Catalogue Numbers 455 through 477: The VEF is a variable length, sequential access file of the variances and exemptions granted by the state to public water systems.

7. Enforcement Actions Subsystem (ENAC)

- a. Enforcement Actions File (EAF), Exhibit ENAC.202, Data Element Catalogue Numbers 430 through 454: The EAF is a variable length, sequential access file of enforcement actions being monitored by the state.

8. Operator and Mailing Subsystem (OPER)

- a. Operator and Mailing File (OMF), Exhibit OPER.200, Data Element Catalogue Numbers 478 through 491: The OMF is a variable length, sequential access file of mailing information and records of certified operators.

(Sanitary Survey Subsystem (SRVY) does not create any permanent files.)

III. Subsystem Descriptions

A. Public Water System Inventory Subsystem (PWSI)

1. General Description

The Public Water System Inventory Subsystem (PWSI) is central to and a mandatory subsystem of the Model State Information System (MSIS). This subsystem maintains descriptive data about Public Water Systems (PWS's) on a Public Water File (PWF). This file is also used by other subsystems. The principal function of the PWSI Subsystem is to create and maintain this file and to display its contents upon request.

The PWF is used in the following subsystems:

- Water Quality Compliance Subsystem (WAQC) uses the PWF to identify state defined regulation criteria for each specific PWS.
- Federal Reporting Subsystem (FEDR) uses the PWF to report on the individual PWS's which were modified in a specific reporting period.
- Sanitary Survey Subsystem (SRVY) uses the PWF to selectively weigh and list PWS's for survey purposes according to specific criteria.

In addition, some basic descriptive data is maintained in a direct access file, the Public Water Table (PWT), that is used as a verification aid and as a source of Public Water File data by the following subsystems: Enforcement Actions Subsystem, Variances and Exemptions Subsystem, and Operator and Mailing Subsystem. This table is built from the PWF.

3. PWSI Subsystem Overview

The overall design of the PWSI includes the following functions:

- conversion of the PWF from the National Inventory File
- data entry and updating
- selection of data for reporting from the Public Water File and Public History File
- condensed reporting
- state discretionary data reporting
- Public Water System production data reporting
- comprehensive reporting
- history file maintenance, purge and reporting
- initial creation of the PWF from the national PWS Inventory File
- creation of the PWT

The main features of the PWSI Subsystem are

- Inputs do not depend on automation of other optional subsystems
- A sequential file and a direct-access table
- Variable length record for each PWS dependant on the number of water sources
- Flexible reporting modules that allow the user to specify selection criteria and sort sequence, but within predetermined print formats
- Suitable for annual reporting to EPA

Inputs to the subsystem consist of source documents that are transcribed on special input forms and then keypunched. The regular process is to read the input transactions and edit and verify all verifiable data. Transactions without errors are used to update the PWF, and those in error appear on an error list produced to facilitate correction of errors. Periodically and upon request, the PWF can be used to list an inventory of Public Water Systems and other information for use by state officials.

The inputs to PWSI Subsystem emanate from such sources as:

- EPA National PWS Inventory File (an initial conversion process)
- Sanitary surveys scheduled or performed
- Permits for new PWS's
- Updates received from PWS operators
- Updates received from V&EX, if subsystem is used
- Updates received from WAQC

Except for data from the EPA National PWS Inventory File, all inputs must be transcribed on a single input form that may be used for all these transactions (See Exhibit PWSI.400-401).

Exhibit PWSI.400-401 contains the format for PWS status and entry. This form serves two purposes:

- As an input form for the creation of a new PWS record
- As a turnaround document on which a PWS status is printed and which can be used to make changes and corrections to the record.

B. Regulations Subsystem (REGS)

1. General Description

The Regulations Subsystem (REGS) is a mandatory subsystem whose purpose is to create the Regulations File (RGF). The RGF is a file of records containing the Federal and/or state regulations for contaminants monitored in drinking water. The RGF serves as a basis for determining whether water samples taken from a PWS distribution system are in compliance with chemical, radiological, bacteriological or turbidity State or Federal Regulations. Each record on the RGF pertains specifically to information necessary to define a State or Federal Regulation for one contaminant. In addition, Federal and State Regulation tables such as the fluoride temperature dependent maximum contaminant levels are included in the RGF.

Drinking water quality is determined by comparing the results of laboratory analysis with the requirements of the National Interim Primary Drinking Water Regulations as contained on the RGF. These regulations specify the number of samples required, analysis methods allowed, and contaminant levels permitted. In some instances Federal standards are modifiable by the States (for example, as in 141.27, using alternative analytical techniques). A State may also choose to enforce its own, more stringent standards, in which case, a Public Water System (PWS) may be in violation of the state's standards, but not of the federal standards.

The RGF is used by the Water Quality Compliance Subsystem (WAQC) for determining Maximum Contaminant Level (MCL) and Sampling Violations and for scheduling samples and subsequent analysis for a given PWS.

3. REGS Subsystem Overview

The Regulations Subsystem consists of only two modules (REGS010 and REGS020) whose functions are to accept input transactions to create the Regulations File (RGF) and list its contents.

The fundamental structure of the RGF follows the National Interim Primary Drinking Water Regulations. If a State defines its regulations differently, the file formats may not fit the structure of the State regulation and a special interface must be developed for that State. States may, however, add contaminants to the file so long as the basic structure of the record is not violated.

The input consists of cards keypunched from the Regulations Subsystem input forms (Exhibits REGS.101 to 108). The output comprises the Regulations Tables and Reports (Exhibit REGS.301 - 308). The process consists of reading and editing all input transactions, creating a new RGF and listing its contents.

Since the regulations are expected to be fairly static once established, the system does not provide individual record update capability. Each time a regulation is changed, data from the new set of keypunched cards entirely rebuilds the RGF. However, states that have access to sophisticated computerized text editors may wish to maintain the RGF through such existing procedures.

C. Water Quality Compliance Subsystem (WAQC)

1. General Description

The Water Quality Compliance Subsystem (WAQC) is a mandatory subsystem which is designed to monitor the quality of the drinking water supplied to the public. Two levels of PWS compliance with the Safe Drinking Water Act may be defined. The first, or primary level of compliance is achieved by using those treatment, storage, and distribution methods needed to supply safe drinking water. A secondary compliance level is achieved by monitoring the quality of the drinking water being supplied to the public. This is a more indirect level and, therefore, less desirable method of detecting problems. Primary compliance actions are designed to prevent problems before they arise; secondary compliance activities are designed to identify problems and correct them after they have arisen.

Primary compliance can be controlled by a state in two ways; by a permit program for new PWS or by periodic sanitary surveys. A permit program is essentially a sanitary engineering task. The PWSI Subsystem will be used to maintain most data elements related to facilities. The Sanitary Survey Subsystem is used to schedule inspections of PWS facilities and thus provides a second way of controlling basic compliance.

Secondary compliance is accomplished by monitoring the sampling and analysis of finished water. The WAQC is designed to provide the means for this monitoring process.

There are eight requirements in the National Interim Primary Drinking Water Regulations that a PWS could violate:

- (1) Maximum Contaminant Level (MCL).
- (2) Sampling requirements: number, frequency, and methodology;
- (3) Check sampling;
- (4) State notification;
- (5) Public notification;
- (6) Treatment techniques;
- (7) Violation of compliance schedule under a variance or exemption;
- (8) Record Keeping.

The main purpose of the WAQC is to identify violations of the first three of these regulatory requirements. In this way,

the Water Quality Compliance Subsystem compliments the PWSI Subsystem and the Sanitary Survey (SRVY) Subsystem by providing data management for tracing non-compliance with the Safe Drinking Water Act.

Secondary compliance can be further classified as compliance with the National Interim Primary Drinking Water Regulations or compliance with the state's own standards. There is a need to identify both, and also to indicate if non-compliance is temporarily overruled by variances or exemptions. The WAQC Subsystem responds to this need by using the Regulations File (RGF) and the Public Water File (PWF).

3. WAQC Subsystem Overview

The WAQC contains programs to carry out the following functions:

- Data Entry and Updating
- Selection and Sorting
- Reporting
- Purging
- Summarizing
- Violation Identification
- Sample Scheduling

The main features of the Water Quality Compliance Subsystem are:

- Batch, sequential processing;
- Interaction with the other MSIS Subsystem;
- Flexible selection and reporting modules that allow the user to specify record selection and sort sequence, but within predetermined print formats;
- Identification of violations of sampling requirements and contaminant levels.

Analysis result input transactions are entered via sample data input forms for bacteriological, turbidity, chemical, and radiological samples. Input transactions may also be used for creating, deleting, or updating files (Periodic Sample File, Sample Analysis File, Violations File, Laboratory Table)

The three basic transactions in the sample data, file updates, and file deletions -- are discussed below:

a. Sample Data

The system is designed to accept three types of samples described below -- bacteriological, turbidity, and chemical and radiological samples.

1. Bacteriological Samples

Bacteriological samples may be reported by each PWS on a monthly summary form (Exhibit WAQC.108 and 402) or as a list of samples (Exhibit WAQC.107 and 401). The state may use the Bacteriological Reporting Requirements Flag on the inventory record to indicate the reporting mode for each PWS. If the flag is not set, it is assumed that the PWS is reporting on a list.

2. Turbidity Samples

A PWS may report turbidity samples on a summary form (Exhibit WAQC.108 and 407) or a list of individual samples (Exhibit WAQC.107 and 405). The state may use the Turbidity Reporting Requirements Flag on the inventory record to indicate the reporting mode for each PWS. If the flag is not set, it is assumed that the PWS is reporting on a list.

3. Chemical and Radiological Samples

Results of samples for chemical and radiological analysis must be reported individually (Exhibits WAQC.106, 400). This form contains only the contaminants included in the National Interim Primary Drinking Water Regulations; states may add more contaminants to its individual forms if desired.

b. File Updates

Violations which are not automatically identified by the Water Quality Compliance Subsystem must be reported using the Violation Reporting Form for additions or updates to the Violations file.

c. Deletion

The Sample Analysis File (SAP) and Violations File (VIP) use code 99 for deletions. The Periodic Sample File (PSF) is an exception; it uses code 01 for deletion. This exception was permitted because the PSF does not allow updating. The only way an update can be

accomplished is to first delete (code 01) and, second, add a corrected version.

All analysis result input transactions are edited and posted to the Periodic Sample File (PSF) which is used to collect and store data during the compliance cycle. Every reporting period, some of the data from the PSF will be summarized and posted to the Sample Analysis File (SAF).

The PWF, VEF and the Violations File (VIP) are matched to create a Deviations File and modified Public Water File (PWF). These two files constitute most of the annual reporting requirements.

D. Federal Reporting Subsystem (FEDR)

1. General Description

The Federal Reporting Subsystem (FEDR) is a mandatory subsystem which produces two of the four files needed to meet requirements as specified in Section 142.15 of the Interim Primary Drinking Water Regulations that must be sent to EPA by states who assume primary enforcement responsibility. These include:

- Additions to the National Public Water System Inventory or any Public Water File record which was modified in the past year.
- All Federal violations of the primary drinking water regulations;
- All variances or exemptions being considered or granted by the state and the status of each of the variances and exemptions.

The purpose of the FEDR Subsystem is to retrieve data elements from the state's files, and if necessary, reformat them, and create two files for reporting to EPA. There are two modules FEDR010 and 020.

3. FEDR Subsystem Overview

The features of the subsystem are:

- Batch processing of the Public Water File, Variance and Exemption File, and the Violations File which are necessary for periodic reporting to EPA.
- Output is in the format required by EPA for reporting

One of the potential benefits from implementing the subsystem is that states need not perform any special action for the annual report to EPA. Execution of the Federal Reporting Subsystem will automatically produce a Public Water File of all new or modified Public Water Systems and a file of all Federal Violations and Variance and Exemptions, unless the Variances and Exemptions Subsystem is not implemented, in which case their reporting must be done manually. This will save states using the Model State Information System the expense of preparing special summaries or input forms for EPA. And EPA will enjoy the benefit of standard formatted input files and more timely, accurate, and formatted input to its own data management system.

The process in preparing files and reports to submit to EPA is composed of the following steps:

- a. Update the Violations File (VIF) with all current Violations data (module WAQC120) and produce the Compliance Summary Report (module WAQC125), selecting only those records which violate the Federal Interim Primary Drinking Water Regulations.
- b* Update the Variances and Exemptions File (VEF) with all current Variances and Exemptions data (module VAEX010) and produce the Variances and Exemptions Condensed Report (modules VAEX040, VAEX041).
- c. Run the Federal Reporting jobstream which will:
 1. Build the modified Public Water File (PWF) (module FEDR010).
 2. Build the Deviations File (DVF) (module FEDR020).
- d. Run the following jobs which will complete the Federal Reporting Process:
 1. Produce the Public Water System Condensed Report from the modified PWF (modules PWSI020, PWSI030).
 - 2# Copy the Enforcement Actions File (EAF).
 - 3# Produce the Enforcement Actions Case History Report (modules ENAC020, ENAC030).

The files that are required for reporting are then ready, together with reports of their contents. Copies of the reports which were produced in the above steps should be made available for public inspection as required by 142,15(d) of the regulations.

*Note: These steps are bypassed if the subsystem referred to is not installed.

E. Standard Processing Subsystem (MSIS)

1. General Description

The Standard Processing Subsystem (MSIS) is a mandatory utility subsystem. It provides all of the other subsystems except Federal Reporting (FEDR) and Sanitary Survey (SRYV) Subsystems, with edit criteria and error processing. It provides a history file for Enforcement Actions (ENAC), Operator and Mailing (OPER), Variances and Exemptions (VAEX), and Violations File (VIP) from Water Quality Compliance (WAQC).

3. MSIS Subsystem Overview

The major functions of the MSIS subsystem are:

- Code Value Table (CVT), Data Element Table (DET), and Error Message Table (EMT) Creation
- Error handling
- History maintenance, purge, and reporting
- History record selection and reporting

The main features of the subsystem are:

- Sequential files and tables
- Batch processing
- Flexible record selection and reporting modules

The Code Value Table (CVT), Data Element Table (DET), and Error Message Table (EMT) are created in module MSIS030 from input forms Exhibits MSIS.102, 103, 104.

The Standard Error File (SEF) is created by all subsystems except the Sanitary Survey Subsystem (SRVY) and Federal Reporting Subsystem (FEDR) and processed by the MSIS Subsystem.

The Standard History File (SHF) is created by the Water Quality Compliance Subsystem (WAQC), and the Variances and Exemptions Subsystem (VAEX), Enforcement Actions Subsystem (ENAC), and Operator and Mailing Subsystem (OPER) if used by the state or region, and is then processed by the MSIS Subsystem.

F. Variances and Exemptions Subsystem (VAEX)

1. General Description

The purpose of this optional subsystem is to provide the state or region with a method for collection, maintenance and processing of data related to the process of granting variances or exemptions from State or Federal Regulations. The variances and exemptions are granted by states who have primary enforcement responsibility. For States that have not qualified for primary enforcement responsibility, the EPA region is authorized to grant variances and exemptions.

Variances and exemptions may not be granted if to do so would result in an "unreasonable risk to health". EPA has indicated that this is to be interpreted to mean that no variances or exemptions from bacteriological Maximum Contaminant Levels (MCL's) should be permitted. Variances and exemptions, therefore, will probably be permitted only from the chemical contaminant levels.

Variances and exemptions both have essentially the same result. Both effectively exempt a Public Water System from one or more requirements of the regulations. The difference lies in the circumstances under which they may be granted and the length of time allowed for compliance.

a. Variances

1. A variance from a maximum contaminant limit may be granted if a PWS is unable to comply because it is unable to make its raw water source safe for technological reasons. For example, many water systems in the southern part of Virginia draw their water from sources containing a naturally high concentration of fluoride. These systems will probably have to find an alternative source of water either by building a new treatment plant at another location or purchasing their water from a safe supplier. Until they are able to locate an alternative source and build the necessary treatment facilities or locate a safe supplier, they will need a variance from the fluoride contaminant limit.
2. A variance from the required treatment technique may be granted if a PWS can demonstrate that the treatment is not required because of the high quality of its raw water. In this case, the raw water is naturally free from a particular type of contaminant or contains low enough levels that it is unnecessary to treat it for that particular type of contaminant.

The first type of variance will be terminated when the system comes into compliance with the standard. The second type may be terminated at any time upon a finding that the nature of the raw water sources has changed to the extent that treatment is required. In effect, both types of variances will be granted for indefinite time periods with no legislated termination date.

b. Exemptions

Exemptions may be granted to PWS's that are unable to comply for compelling reasons, mainly economic ones. In other words, an exemption is designed to solve the problem of systems that cannot afford to apply available treatment technology rather than the problem of systems that cannot make their water safe with even the best available treatment technology. Exemptions address an economic problem, variances, a technical problem. Unlike variances, moreover, exemptions cannot be granted for indefinite time periods. The act itself states that compliance must occur by certain dates.

Exemptions are clearly aimed at the economic problems of smaller systems. The states or regions can use exemptions to give smaller systems additional time to comply with the regulations, but the Act contains specific cutoff dates by which these systems must be in compliance regardless of the cost.

If a variance or exemption is granted, the state or EPA region must prescribe a schedule for compliance and interim control measures within one year of the date it is granted. The state or region must monitor actual progress against this schedule in the same way that it has to monitor compliance with the main body of drinking water regulations.

3. VAEX Subsystem Overview

The VAEX subsystem must maintain variances and exemption information for three purposes. First, this type of information is required by the Federal Reporting Subsystem (FEDR) for reporting to EPA. Second, information is required for monitoring progress against compliance schedules specified in particular variances and exemptions for particular Public Water Systems. Last, any variance or exemption data needed for determining compliance will be generated by this subsystem and transmitted to the Public Water File.

The major functions of VAEX are:

- Data Entry and Updating
- Selection and Reporting
- Providing data to the Public Water System Inventory Subsystem.

The main features of the VAEX subsystem are:

- Sequential, variable length file;
- Batch processing;
- Flexibility in reporting with respect to selection, sorting, summarizing;
- Subsystem is optional and can be used if needed.

The source of transactions to create and maintain the Variances and Exemptions File (VEF) is the administrative unit responsible for the granting and monitoring of variances and exemptions.

All variances and exemptions on the VEF are identified by a sequential identification number. Accordingly, transactions refer to a VEF record by that number in positions 1 to 5 of the record. There are four types of transactions: addition of a new VEF record, milestone creations, changes to data elements in an existing record, and deletion of an existing record. All transactions are identified by a two-digit transaction code in positions 6 to 7 of the record. The transaction key, positions 1-7, is a combination of VAEX-ID and transaction code. Reference input forms layout in Exhibit VAEX.100, 101, 107.

G. Enforcement Actions Subsystem (ENAC)

1. General Description

The purpose of this optional subsystem is to provide the state or region with a method for collection, maintenance, and processing of data related to actions performed in connection with enforcing the state's own regulations (or the Federal Regulations) under the Safe Drinking Water Act. The data can then be used for evaluating the effectiveness of different types of enforcement actions. Reporting to EPA of enforcement actions, as required by section 142.15 of the regulations, can also be done automatically using the subsystem by submitting to EPA the reports of the entire Enforcement Actions File (EAF).

3. ENAC Subsystem Overview

The major functions of ENAC are:

- Data entry and updating
- Selection and reporting

The subsystem has the following features:

- Flexibility in preparing reports with respect to selection criteria and sorting;
- Subsystem is optional within MSIS;
- Batch processing using sequential files.

The source of transactions to create and maintain records in the Enforcement Actions File (EAF) is the administrative unit responsible for enforcing the drinking water regulations by formal actions.

A five-digit sequential number is used to identify an Enforcement Action record. This number in positions 1 to 5 of a transaction and transaction code in positions 6 and 7 constitute the transaction key.

H. Sanitary Survey Subsystem (SRVY)

1. General Description

The Sanitary Survey Subsystem (SRVY) is an optional subsystem designed to satisfy Section 142.10 (B) (2) of the Drinking Water Standards Implementation Regulations which requires states that assume enforcement responsibility to have "A systematic program for conducting sanitary survey compliance..."

A survey of 24 states shows that many states do not have enough manpower to survey as they would like. The addition of non-community Public Water Systems (PWS's) to those already under regulation, will increase the need for a systematic method of scheduling sanitary surveys. The Sanitary Survey Subsystem is designed to provide this systematic method.

The method is based on assigning different weight to five parameters: PWS type size of population served, the type of source water and Public Water System has, compliance history, and period elapsed since last survey. State officials can change the relative weights until a satisfactory formula is reached.

3. System Overview

The major functions of SRVY are:

- Scheduling
- Reporting

The features of the subsystem are:

- Simple, batch processing;
- Generation of Public Water File form designed as a turnaround document for computer input processing;
- Interaction with the PWSI Subsystem.

SRVY uses the Public Water File (PWF) and Violations File (VIF) to identify systems who are in violation and those who fit the prescribed conditions for selection.

I. Operator and Mailing Subsystem (OPER)

1. General Description

The Operator and Mailing Subsystem (OPER) is an optional subsystem designed for two purposes: first, to provide management with data concerning certified operators, and second, to provide the state with the capability to manage a mailing distribution list for mailing material to local governments, cities, consulting engineers, etc. Since the mailing list and operator data requirements are similar, these two functions are combined in a single subsystem.

3. OPER Subsystem Overview

The major functions of OPER are:

- Data Entry and Update
- Selection and Reporting
- Label Printing

The subsystem features:

- Off-line batch processing
- Sequential processing of a variable length
- Flexibility in reporting or printing labels with respect to selection and sorting.

Transactions to maintain the Operator and Mailing File (OMF) are of three types: add a new record, change data elements in an existing record, and deletion of a record. Records are identified by a five-digit sequential number and an addressee type code.

Addressee type '0' is reserved for operators. Other addressee types are left to be defined by each state according to its needs.

Because an operator record contains more information than other addressee type records, there are two different input forms for the two types (see Exhibits OPER.107 and 108). The difference between the two is that transaction '03' applies only to operator records.

Model State Information System

